FLIGHT

MAGAZINE

MAY 1957

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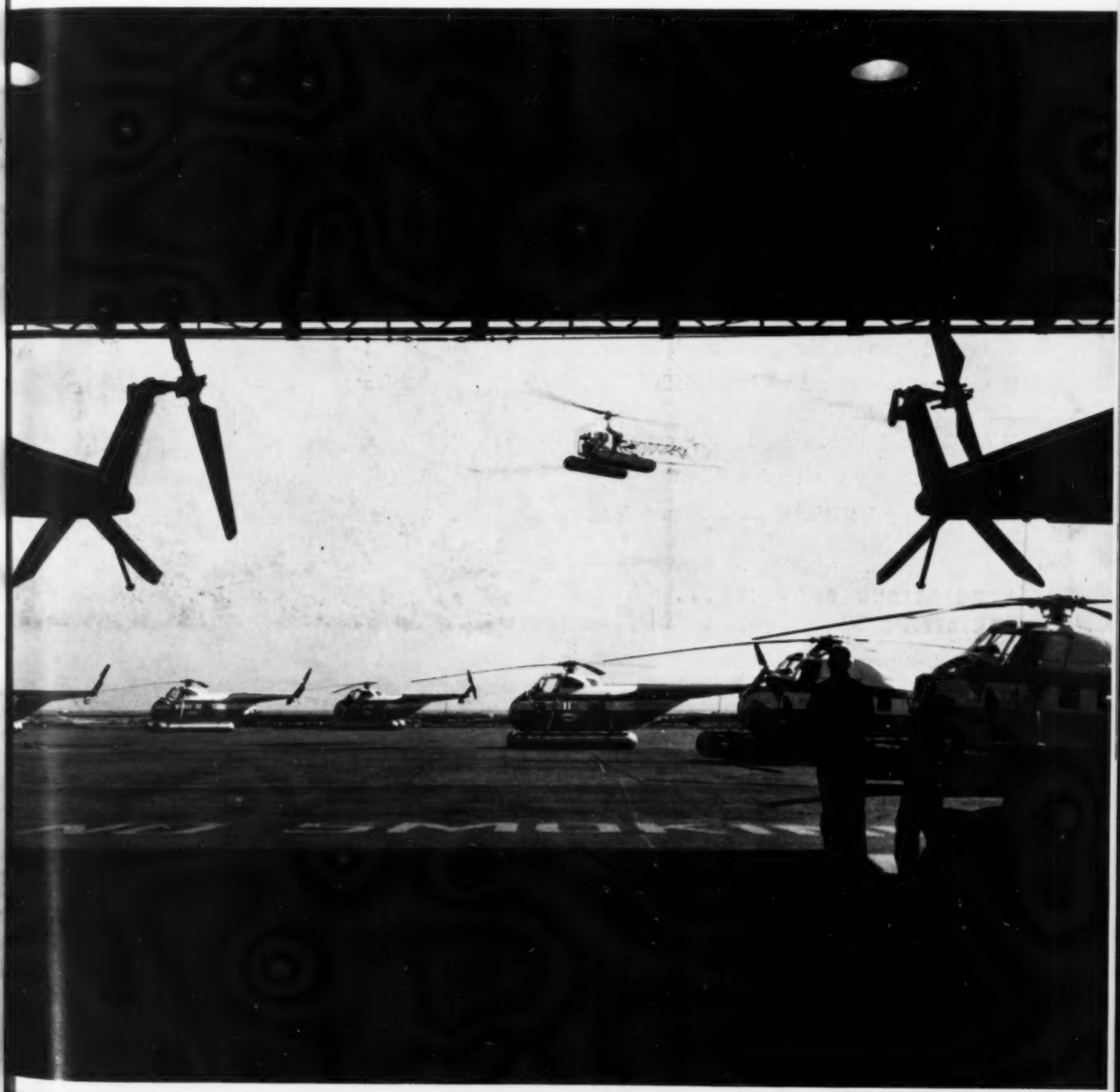

OFFSHORE HELICOPTER AIRLIFT

See page 36

at Aero of Atlanta

examination is more than skin-deep!

To the airplane mechanic as well as the physician, the X-ray reveals hidden conditions. Structural flaws are brought to light. To the knowledge thus gained we bring skilled hands.

X-ray inspection of multi-engine aircraft is just one of many services found in the *complete* shop facilities of Aero Corporation.

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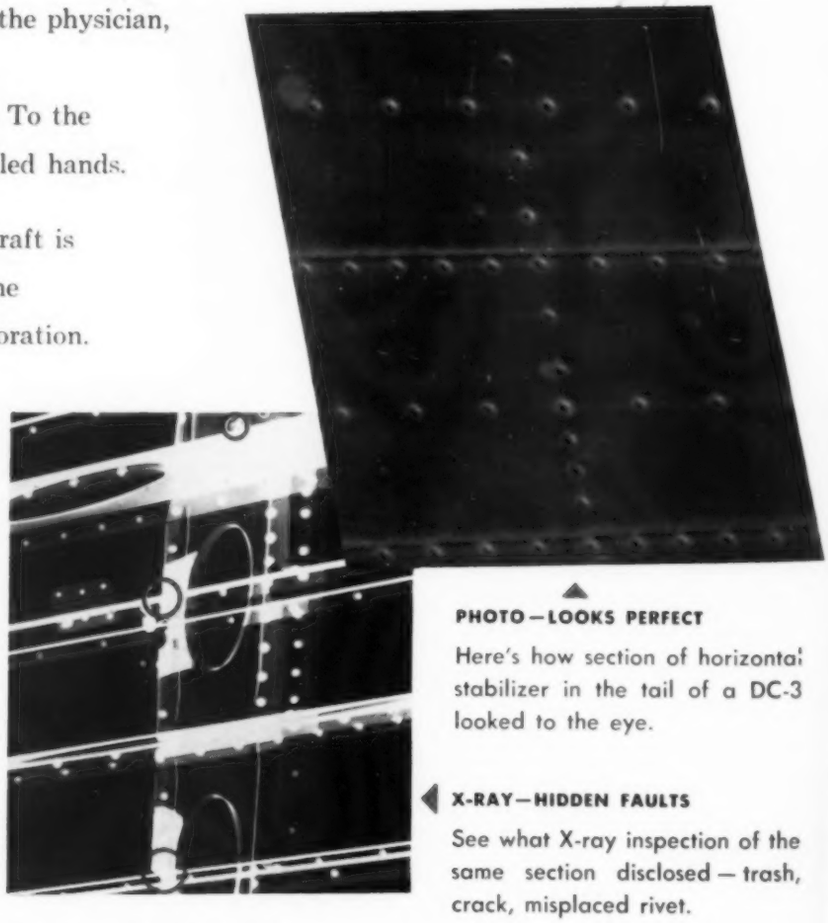

PHOTO—LOOKS PERFECT

Here's how section of horizontal stabilizer in the tail of a DC-3 looked to the eye.

X-RAY—HIDDEN FAULTS

See what X-ray inspection of the same section disclosed — trash, crack, misplaced rivet.

For further information call or write

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It's the Goodyear "Sign of Service"—service that has grown and kept pace with the phenomenal growth of private aviation.

This growth—and the acceptance it enjoys among flying consumers—is not due to "bigness" alone.

It has become the largest service network in the nation for reasons well known to the thousands of civil aircraft operators it serves each year.

Reasons like the way fair play is a must with airport dealers who fly this sign; like the fact that strategically located distribution points assure these men complete stocks of the things you need; like the foremost quality of the parts they carry; like the skills and workmanship of the mechanics who put this service into practice.

In short, it's the sign of a man with a reputation for dependability—backed by a complete line of parts that are tops in the aviation field. So, taxi on over and sample some *real* service!

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P.O. Box 271, Mineola, Long Island, N. Y.

FROM BRIDE TO BIRDWOMAN

Alys McKey Bryant, one of America's first woman pilots, one-time holder of the woman's altitude record, and an aerial performer of note.

(*Photos Courtesy National Air Museum, Smithsonian Institution*)

ALYS MCKEY met John Milton Bryant the day she helped pull him from a crashed airplane. In the days that followed, while she called on the young pilot during his recovery, she became more and more interested in flying.

So, in December, 1912, Alys learned to fly. She then married John Bryant and joined him in an aerial flying act, billed as "The Bennett Flyers." The Bryants became one of the most prominent flying teams in the Pacific Northwest, appearing at fairs, carnivals and specially arranged meets.

Mrs. Bryant flew under her maiden name and established a number of records, including the woman's altitude record, and was one of the first women to fly in Canada. John Bryant was a notable flyer of the era, as was his brother Frank, a third member of the troupe.

After her barnstorming days were over, Mrs. Bryant became connected with the Benoist Company, manufacturer of flying boats. During World War I she worked with the Goodyear Company in the development and construction of airships.

A pioneer in research and development of aviation fuels, Phillips Petroleum Company is, today, a foremost supplier of high octane gasoline for commercial, private and military aircraft.

In step with the future, Phillips is a leading producer of *super-performance* Jet Fuels for the latest designs in turbo-props and jets. And Phillips research continues to lead the way for development of fuels for the aircraft of tomorrow.

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AIR Report
Significant Trends and News

THE 1,000TH TWIN-ENGINE PIPER APACHE was delivered last month to Dr. Thomas J. Gamble, Encino, California, whose first airplane was a Piper Tri-Pacer two years ago. Delivery of the 1,000th Apache came exactly 3 years after the first Apache delivery in April, 1954. The popular light twin, powered by two 150-hp. Lycoming engines, is now being produced at a rate of two airplanes daily, which is the equivalent of about 500 Apaches annually. . . . Total Piper sales in March, including spare parts, topped the $3,000,000 mark for a new monthly record in the firm's 29-year history. During the 6-month period ended March 31, Piper delivered 1,248 airplanes representing 42.5 per cent of the total volume of business aircraft deliveries reported for that period by the Aircraft Industries Association. Gross sales for the period were $14,455,816 for Piper, with net income after taxes of $1,592,109 — a 22 per cent increase in sales and a 46 per cent increase in net profit.

DEVELOPMENT OF A NEW BEECH EXECUTIVE TRANSPORT FOR 1960 was hinted last month by Mrs. O. A. Beech, president of Beech Aircraft Corporation. "Beechcraft's plans for its new 1960 executive transport are very exciting," she said in the last sentence of an announcement of six-months sales gains. Inquiries at the factory could produce no details of the 1960 airplane. . . . Beech sales totaled $48,313,125 and net income after taxes came to $1,586,406 for the 6-month period ended March 31, sales being up more than 30 per cent over the same 1956 period. March sales exceeded $10.9 million, largest volume for any month since June, 1945. . . . Sales of Beech business planes for the 6-month reporting period were $16,197,943 as compared to $13,855,259 for the same 1956 period, with a 45 per cent gain in Super 18 sales.

CESSNA AIRCRAFT COMPANY sales of $17,233,000 were reported for the January-March quarter as compared to $15,004,000 for the first 1956 quarter, with 1957 first-quarter earnings, after taxes, of $852,000. Dwane L. Wallace, president, said commercial aircraft sales were better than original expectations with exceptionally strong orders for the twin-engine Model 310. He said abnormally high engineering costs are being absorbed this year in getting the YH-41 helicopter into production and in completing the four-engine Model 620 corporate transport project for early 1958 production. He expects substantial increases in volume and profit during 1958 and future years.

AERO COMMANDER SUPER 680 BUSINESS TRANSPORTS have become airliners in South America, with a new Argentine airline, Aero Transportes Litoral Argentino, operating 8 to 10 flights daily transporting passengers and cargo between Rosario in Santa Fe Province and Buenos Aires, Montevideo, Mar del Plata, Bahia Blanca, Mendoza, Cordoba, Tocuman and Resistencia.

THE 500TH AERO COMMANDER completed early in April, has been placed in operation by Aero Design & Engineering Company as a "gold plated" company show plane. It is a Super 680 finished in gold paint with black trim and featuring gold and black leather upholstering in a Horton & Horton Gold Crest interior. Bob White, vice president in charge of sales, has shown it on several recent trips. Meanwhile, the 566th Aero Commander was on the production line in Oklahoma City late in April.

FAILURE OF THE SMALL BUSINESS ADMINISTRATION to follow through on expediting loans to fixed-

FLIGHT MAGAZINE

MAY, 1957 VOL. 46, No. 5

THIS MONTH'S COVER pictures the largest corporate helicopter operation in the world — at Humble Oil and Refining Company's Grand Isle, Louisiana, heliport, which services the firm's offshore drilling rigs in the Gulf of Mexico. This fleet of Sikorsky and Bell copters carried more than 85,000 passengers last year, will carry over 150,000 passengers this year— all company employes.

—(Humble Oil and Refining Photo.)

Air Report—SIGNIFICANT TRENDS AND NEWS 5

Airmen's Calendar—COMING EVENTS 6

Just Among Ourselves—EDITORIALS: AIRWAYS MODERNIZATION BOARD NEEDED; WHY HIDE THE FACTS; SILVER ANNIVERSARY FOR BEECH; POSTSCRIPT TO HANGARS; GAMBLING WITH AIRLIFT 13

General Aviation Facilities Requirements Survey—PART I: COMPOSITION OF GENERAL AVIATION TODAY 24

Airline Equipment for Business Planes—BY TOM ASHLEY— MINIATURIZED RADIO HALVES RACK SPACE AND CUTS WEIGHT BY TWO-THIRDS 29

Offshore Resort for Airmen—GRAND BAHAMA ATTRACTS PIPER DISTRIBUTOR-DEALERS 32

Offshore Helicopter Airlift—SIKORSKY AND BELL FLEET CARRIES MORE PASSENGERS THAN SCHEDULED COPTER AIRLINES . . . 36

How Lindbergh Got His Ryan—A RUSH JOB FOR $10,000 PUT LINDBERGH ACROSS FIRST 38

Instrument Flight Reality for Copters—AN IMPORTANT MILESTONE HAS BEEN REACHED BY A BELL-BENDIX-DECCA DEVELOPMENT 40

New Swiss Trainer—THE 260-HP. PILATUS P-3 RESEMBLES THE NAVION 42

Tilting-Wing Vertol Ready for Testing 48

New Business in the Hangar—NATIONWIDE ROUNDUP OF INTERESTING DEVELOPMENTS AT MODIFICATION CENTERS AND ELSEWHERE 50

GEORGE E. HADDAWAY, Editor-Publisher; TOM ASHLEY, Managing Editor; FRED N. STONES, JR., Business Manager; LOUISE ROBERTSON, Circulation; E. H. PICKERING, *Consultant;* P. O. Box 750 (2700 N. Haskell Ave.), Dallas, Texas—Telephone TAylor 3-6191.

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base operators for hangar construction after an encouraging policy statement last year is recognized by top CAA officials in Washington. CAA Administrator James Pyle, whose office cooperated in effecting the SBA hangar-loan policy, hopes to jar loose the program at the Washington level.

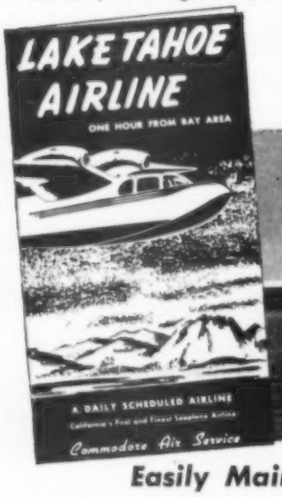
GENERAL AVIATION'S SCOPE today includes 65,000 privately-owned aircraft being flown by 200,000 pilots more than 10,000,000 hours annually and by 1976 the general aviation fleet should comprise 90,000 aircraft flying some 20,000,000 hours annually. For complete details, see page 24 of this issue for the beginning installment of the full text of the recently-completed general aviation facilities requirements survey, released last month following its submission to Edward P. Curtis, President Eisenhower's special assistant for aviation facilities planning. The voluminous survey report was prepared by eleven national aviation organizations comprising the General Aviation Facilities Planning Group.

ESTABLISHMENT OF AN AIRWAYS MODERNIZATION BOARD has been proposed to Congress by President Eisenhower in a bill drafted by his special assistant for Aviation Facilities Planning, Edward P. Curtis, and presented to the President with an interim Curtis report on the gravity of present and anticipated air traffic control problems. The proposed board would have three members, one each representing the Departments of Commerce and Defense and a third appointed by the President. With independent status, it would be responsible for developing and consolidating future air traffic control requirements. It would be an interim agency, charged with establishing within three years the permanent functions of joint test, evaluation and selection of air traffic systems.

REVISED CAA FIVE-YEAR AIR TRAFFIC CONTROL MODERNIZATION PROGRAM has been presented to Congress and provides for equipment costing $810,045,000 between now and 1962. It places emphasis on radar as the best available solution to traffic control problems, providing "positive separation of aircraft by electronic visual means." Equipment includes 73 long-range air route surveillance radars (ARSR), 115 airport surveillance radars (ASR) for terminal areas, 43 precision approach radars(PAR), 74 airport surface detection equipment radars (ASDE), 1,230 Vortacs (common civil-military short-range navigation system providing bearing and distance information), 30 additional instrument landing systems (ILS) with total of 200 ILS's backfitted with Vortac distance measuring

Royal AMPHIBIAN NEWS

Notes on America's only all-new, twin-engine, supercharged, utility amphibian . . . for business flying and charter service operation.



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Easily Maintains 5-Flight, Daily Schedule with Full Gross from Sea Level to 6,200-ft Elevation

When LTA owner Bob Law says, "the Gull is the only ship that'll do it," he's referring to the two-hour, round trip schedule between Sausalito, on San Francisco Bay, and Lake Tahoe, 6,229 feet up in the Sierra Nevada Mountains. LTA's Gull takes only 58 minutes to take off, cover over 130 nautical miles, and land — with a full 6,000-lb gross each way. Try a Gull on your operation.

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Airmen's Calendar

May 8-11—13th Annual American Helicopter Society National Forum, Sheraton-Park Hotel, Washington, D. C., Harry Lounsbury, Executive Secretary.

May 15-17—Jet Age Airport Conference, sponsored by Air Transport Division, American Society of Civil Engineers, Park-Sheraton Hotel, Washington, D. C.

May 21—Airway Traffic Control Symposium for All Minnesota Pilots, sponsored by Minnesota Business Aircraft Association and Air Line Pilots Association.

May 26-June 2—Aviation Writers Association Convention, St. Louis.

June 1—8th Annual Maintenance and Operations Meeting, Reading Aviation Service, Municipal Airport, Reading, Pa.

June 1-9—First Annual National Aviation Trades Show and Exhibits, Monmouth County Airport, New Jersey.

June 7-9—Missouri Air Tour.

June 8-9—10th Annual Moonlight Flight, Porterville, California, Pilots Association.

June 15—International Convention of the Ninety-Nines, Casa de Palmas Hotel, McAllen, Texas.

June 17—Ninety-Nines' International Air Race, McAllen, Texas-Cuba.

June 25—29th Aviation Distributors and Manufacturers Assn. Meeting, Broadmoor Hotel, Colorado Springs.

July 13-19—5th Annual Jaycee Air Cruise, Philadelphia to Las Vegas.

July 30-Aug. 2—2nd Annual National Flying Club Convention, Denver, Colo.

ALLISON POWERS

—THE LOCKHEED C-130 HERCULES

The prop-jet Hercules can take off with a 5,000-gallon tank truck — or 20 tons of combat cargo — and get to the scene of action close on the heels of the fastest jet bombers. Four Allison T56 Prop-Jet engines, driving Aeroproducts turbo-propellers, give it speeds of over 370 mph; range over 3,000 miles; and the ability to take off and land on hastily prepared air strips. The Lockheed C-130 is the backbone of the Tactical Air Command's combat support operations.

A commercial version of the Allison T56 will soon power America's first prop-jet airliner, the new Lockheed Electra. Allison engines are designed and built by America's pioneer producer of turbine aircraft engines.

ALLISON DIVISION OF GENERAL MOTORS — Indianapolis, Indiana

ALLISON *Prop-Jets and Turbo-Jets*

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Keep These Modern Facilities

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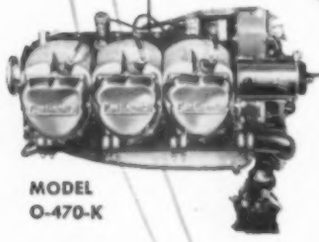
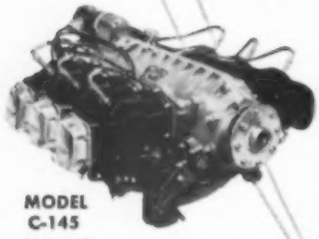
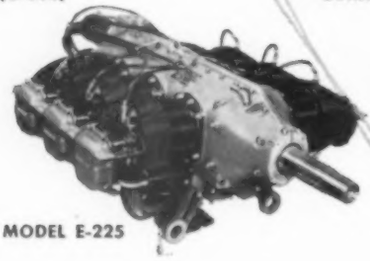


MODEL O-470-K



MODEL C-145 (O-300)



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No two ways about it: the men and machines that produced your airplane engine in the first place are obviously best qualified to keep it in top running condition. That is why Continental's Factory Re-Manufacture Plan is rapidly supplanting the periodic overhaul among users of utility planes. Factory Re-Manufacture gives every owner the benefit of precision facilities and knowhow that simply can't be matched in the field. You get new engine warranty, along with new engine safety and dependability—in a fraction of the time required for overhaul—and new log book with zero engine hours—all this at a modest *predetermined* price. Get in touch with your Continental distributor or write for information.

ALL CONTINENTAL AIRCRAFT ENGINE MODELS ARE AVAILABLE AS FACTORY RE-MANUFACTURED ENGINES

When buying a utility plane, choose one with all the plus values that have made Continental pilots' first choice.

Continental Motors Corporation
AIRCRAFT ENGINE DIVISION
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equipment, 231 air traffic control radar beacons, 77 additional airport traffic control towers and 3 additional air route traffic control centers.

A FOUR-ENGINE TURBOPROP TRANSPORT to be known as the Turboboxcar is being developed by Fairchild Engine and Airplane Corp., which is building a prototype for first flights in mid-1958. It will be powered by the new Lycoming T-55 propjet engine, rated at 1,600 equivalent horsepower and will carry 32,181 lbs. of cargo over short ranges and 21,439 lbs. of cargo 1,500 miles at a gross weight of 75,000 lbs. Designed as a successor to the C-119 Flying Boxcar and the C-123 assault transport, of which more than 1,400 have been produced, it will use boundary layer control for short-field and aircraft carrier operations and will have a pressurized cabin. Normal take-off and landing distances over a 50-ft. obstacle will be 2,240 ft. and 2,050 ft., respectively, and 1,750 ft. for take-off and 1,610 ft. for landing with boundary layer control.

ROTOR-PROPELLERS WITH TRAILING-EDGE FLAPS FOR CYCLIC AND COLLECTIVE CONTROL by changing the lift characteristics of the blades feature a new and different type of short take-off and landing (STOL) aircraft design under development for the Navy by Kaman Aircraft, Bloomfield, Conn. This cyclic and collective control will give the pilot full control at air speeds below 50 mph., above which the flap system in the rotor-props automatically phases out and conventional airplane rudder, elevator and aileron controls take over. The 2-place aircraft has two gas turbines mounted on a stub wing with Fowler flaps. Kaman expects a speed range from zero, or hovering, to over 300 mph. No other details were given.

PRODUCTION OF THE BEECH JET MENTOR TRAINER IN CANADA has been licensed to Canadian Car Co., Ltd., Toronto, in advance of extensive demonstrations of the Model 73 Jet Mentor to the RCAF.

NORTH AMERICAN X-15 ROCKET RESEARCH AIRPLANE is now under construction at Los Angeles and is expected to fly faster and higher than the trail-blazing X-1 and X-2 series which attained speeds exceeding 1,650 mph. and altitudes of 90,000 ft. or more. Reaction Motors, Denville, N. J., is developing its rocket engine. New design techniques have resulted in considerable weight and size savings for the X-15, North American reported.

THE FRENCH-BUILT TWIN-JET CARAVELLE AIRLINER began a two-month demonstration tour of the United States and Canada on May 2, having been flown across the South Atlantic via Africa and South America. One of two prototypes built by Sud Aviation of France, the demon-

(Continued on page 58)

CHRIST OF THE ANDES

New star beneath the southern cross

Soon South America will look up to the new Fairchild F-27 transport already ordered by South American airlines.

This exciting new propjetliner promises to become as popular in the Southern Hemisphere as it is in the North American continent. Its special qualities make it ideal for regional airlines, and a valuable addition to corporate aircraft fleets as well.

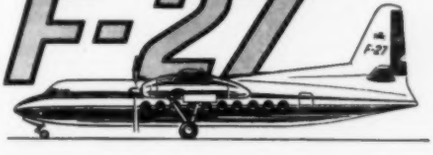
The F-27 is fast—cruises at 280 mph on the power of airline-proven propjet engines. The cabin is pressurized to permit flight over Andes peaks and Pampas plains with equal ease. Small field performance puts most back-country strips within easy F-27 reach.

Tops in versatility, high on performance, the F-27 is low in cost—it's inexpensive to fly, to maintain, to buy.

Address inquiries to: R. James Pfeiffer, Executive Director of Customer Relations, Fairchild Engine & Airplane Corporation, Hagerstown 15, Maryland.

FAIRCHILD

F-27



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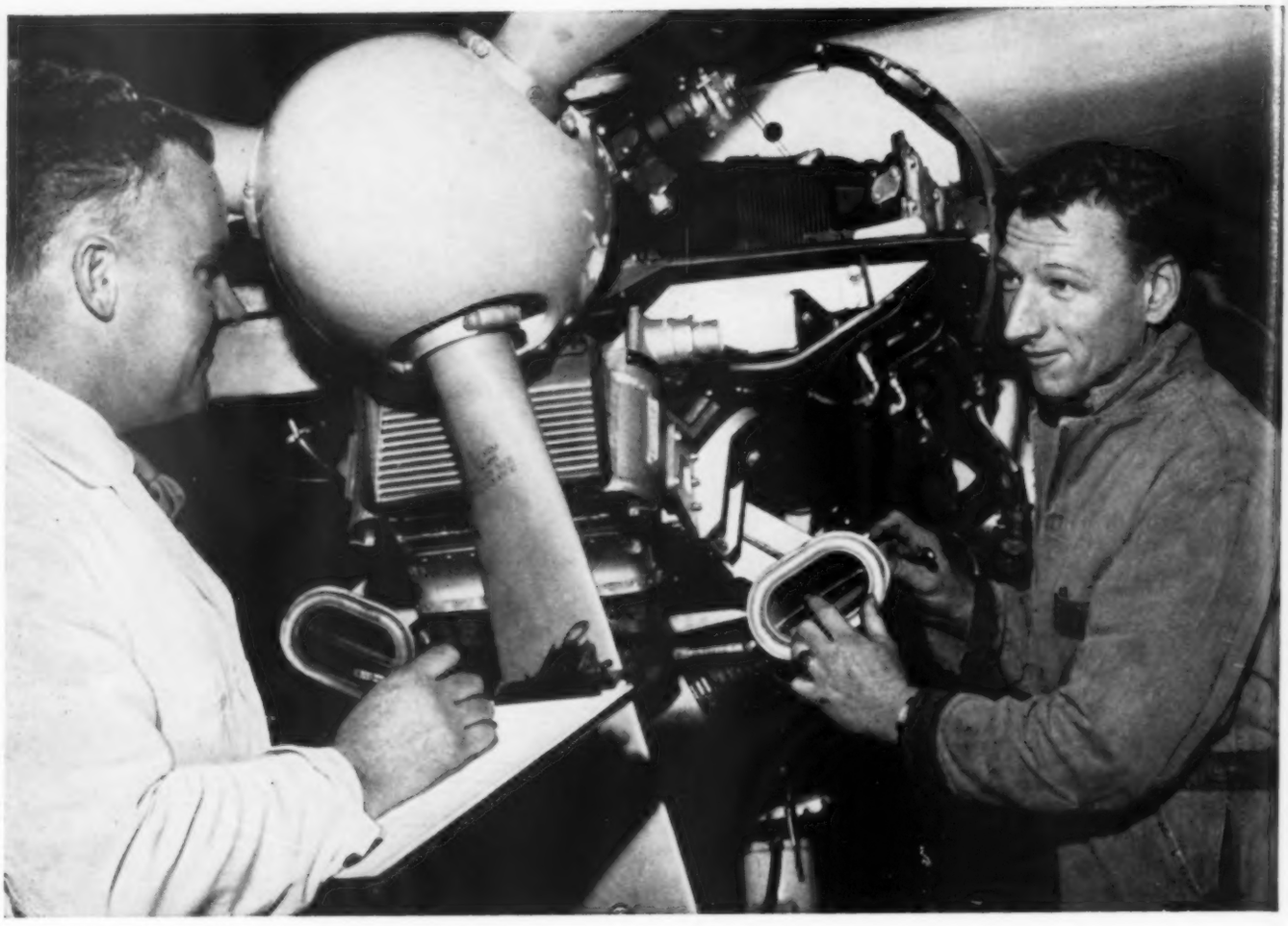

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That means increased periods between engine overhauls, because of less wear and tear on engine parts.

Gulf Aircraft Engine Oil is the finest straight mineral oil you can choose—keeps engines as clean as any straight mineral oil can. But for the greatest possible cleanliness, buy Gulfpride Aviation Oil Series D, the detergent oil.

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Gulf Aircraft Engine Oil—Straight Mineral Oil that minimizes sludge and oil inlet screen deposits, keeping your engine clean and safe.

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TWO HEADS are better than one...

ARC's Course Director CD-1, Teamed with ARC's VOR/ Localizer Receivers 15-D, Shares the Work with the Pilot

More and more pilots rely on the ARC CD-1 Course Director to determine the exact headings required to intercept and fly a desired VOR radial or runway localizer. This electronic "co-pilot" helps them fly with pinpoint precision, greater ease and increased safety, and in four simple steps.

With ARC's CD-1, the pilot selects his VOR or localizer station, sets his Course Director to the bearing of the desired VOR radial or localizer, turns his aircraft until the vertical needle of the cross-pointer meter is centered and steers to keep it centered. His ship will intercept the selected track quickly and smoothly, simultaneously compensating for wind drift. The pilot performs no mental computations, and there's no chance of overshooting the desired course.

This reliable navigational aid adds only 10 pounds to your aircraft. Ask your ARC dealer to install the CD-1, along with a *dual installation* of ARC's Type 15-D VOR/Localizer Equipment. You'll discover how easy flying VOR and Localizers can be – and with new peace of mind.

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SAC Silver Jubilee Newsreel

BY JACK PATTON

A GOOD NAME
OK, MEN... LET'S GET THOSE SIGNALS STRAIGHT!
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1940... EX-GRIDDER HARLAN RAY JOINED GEO. W. JALONICK III AND WINSTON CASTLEBERRY TO BUY CONTROL.
SOUTHWEST AIRMOTIVE
POETIC, AIN'T IT?
THAT SAME YEAR, THE NAME BECAME ITS PRESENT ONE.
SON, SWAP THAT CAYUSE FOR A FLYING MACHINE
WHY?
WHIZBANG OIL CO.
IN PRE-WW II DAYS, BUSINESS PLANES REALLY BECAME POPULAR
I'LL GUARANTEE ONE THING...
IT'S BUILT FOR RANGE NOT COMFORT!!
SAC
SAC MADE A GAS TANK SEAT FOR AIR RACER ARLENE DAVIS' SPARTAN.

Good ideas and good men long have characterized Southwest Airmotive and those with whom it deals. Guiberson Corp.'s radial Diesel engine powered this Gull Wing Stinson in pre-WW II experimental flights throughout the Western Hemisphere. Typical of the skilled pilot breed shaping the stature of business flying is W. L. (Poddy) Parish, shown with the SAC-rebuilt Howard he flew in the mid-'40's for an oil firm.

Winston Castleberry's first loyalties are for customers and for the craftsmen who, since the '30's, have worked so closely with him in his role as a SAC owner and service boss. Here, he presents anniversary gifts to Hunter Louis Beimer, Engine Division chief, and to Angler George Kelley, chief engineer.

1932 —A QUARTER CENTURY OF LEADERSHIP— 1957

Southwest Airmotive Co.
LOVE FIELD DALLAS
DIVISIONS: KANSAS CITY, KANSAS / DENVER, COLORADO

Just among ourselves

EDITORIALS

Airways Modernization Board Needed

THE tremendous problem of modernizing our airways system is now on the road to solution, thanks to President Eisenhower's special assistant for aviation facilities planning, who last month recommended that Congress establish an Airways Modernization Board. It would consist of three members — an independent chairman and designee from the Secretary of Commerce and one from the Secretary of Defense.

The proposed legislation would terminate the Board by June of 1960. During its three years of existence it would develop, modify, test and evaluate systems, procedures, facilities and devices "to meet the needs for safe and efficient navigation and traffic control of all civil and military aviation except for those needs of military agencies which are peculiar to air warfare . . . and select such systems, procedures, facilities and devices as will best serve such needs and will promote maximum coordination of air traffic control and air defense systems. The Board also would be empowered (with the approval of the President) to transfer to itself any functions of the Departments of Defense or Commerce in connection with its duties.

The chairman would be appointed by the President and would have no affiliations with existing government agencies. This seems to us a safe guarantee that he would be completely impartial and unbiased toward any segment of aviation.

The principal value of the proposed Board is to centralize power and responsibility by circumventing the score or more boards, agencies and committees now concerned with aviation facilities which have been unable to cope with the mounting problems of air traffic or to reach agreement on what steps should be taken to modernize our aviation facilities.

It's far too late in the day to sit around and complain about the years eaten up by the locusts when Federal administrations weakened the one agency charged with the responsibility by refusing requested funds and by nibbling away at its authority. Little can be gained now by trying to wipe out or change the historical fact that everything attempted since 1948 has been too little and too late.

The Airways Modernization Board as proposed by the Curtis office is an interim proposition. There will be plenty of time during the next three years to overhaul the statutes and reestablish permanent and practical machinery for the control and maintenance of aviation facilities in accordance with aviation progress.

Meanwhile, we trust that the Congress will see the necessity of granting the President his request for the Airways Modernization Board without delay. Otherwise the present crisis can easily turn into complete chaos.

Why Hide The Facts?

IT'S practically impossible to get the facts from the Civil Aeronautics Administration on fatal accidents in the lightplane category. CAA officials apparently are blind to the fact that much can be learned from every accident and substantial contributions to aviation safety could be made by wide dissemination of accident analyses even though the cause or causes of specific accidents might not be pinned down to irrefutable facts. Pilots and plane owners are desperately interested in every accident that occurs in their particular kind of flying activity. Aviation magazine readers, pilot groups and organizations and thousands of people who might be considering learning to fly or buying a plane should have immediate access to the facts and conditions surrounding all accidents related to their type of operations and planes.

The Civil Aeronautics Board, limiting their investigations to large aircraft above 12,500 pounds, mainly in the air transport category, do a fairly good job of accident analysis although there's an intolerable lag between the time of the accident and the final report.

It is quite obvious that the CAA agents who make lightplane accident investigations are just as air-wise and competent in their particular field as the CAB safety people. So it all boils down to top CAA policy where, in recent years, we've observed an unfortunate trend away from the public service angle. The CAA is lapsing back into the old pre-war attitude of bureaucratic officiousness and do-nothing. Perhaps the root of the problem lies in the office of the Secretary of Commerce, who now holds the whiphand over the CAA and, especially during the past six years, has demonstrated time and time again its inability to understand even the simple A B C's of civil aviation and legally constituted CAA responsibilities.

Despite this top-side Commerce Department misdirection of CAA duties and functions, we believe the CAA could revamp its accident reporting policies and get the facts to the people most concerned. Failure to provide such public service is hurting the CAA as much as the industry. The two hundred thousand active pilots who fly the 65,000 active civil aircraft in the general aviation fleet are growing restive about the lack of CAA public services. It would be wise for CAA to take cognizance of the clouds on the horizon and be something more than a traffic control and policing agency. The handling of general aviation accidents is but one of many areas of public service that can stand improvement.

Silver Anniversary For Beech

TWENTY-FIVE years ago Walter Beech sold out his Travel Air company in Wichita to the Curtiss-Wright company and established the Beech Aircraft Corporation, one of the real extraordinary aviation manufacturing concerns in the world.

The Beech company has throughout

its twenty-five-year span followed the traditional Horatio Alger pattern of struggling for its very existence during the early hamburger days, rapidly expanding into a vital wartime production enterprise in the 40's and emerging into the present era as one of the blue ribbon companies well diversified by commercial and military production.

What made Beech one of the unique companies in world aviation? In the first place Walter Beech was a practical engineer. He did not copy other engineers and designers; rather, he was the epitome of original design. He always recognized a basic fact of life about this business — that engineering and experimentation were its life's blood, that it was not a production industry. The amazing Beechcraft designs from that fantastic performer, the old stagger-wing job, to the Bonanzas, Twin-Bonanzas, Super 18's and Mentor military trainers on today's production lines rank in the top echelon of world famous aircraft no matter what measuring stick is used but especially by one standard — that of performance.

Another aspect of the Beech company that certainly contributed to its present enviable position of success rests on a fine distributor organization, as traditional with Beech as its engineering ability. The inevitable conflicts that arise between factories and distributor organizations have always been held to a minimum in the case of Beech largely because the factory rarely took the attitude of knowing-all and doing-no-wrong. Its distributors have always been called in to help shape company policy.

Finally, an ingredient of success that can't be passed over in looking back on the scintillating quarter century of Beech progress is the loyal band of employes, now numbering close to 8,000, who are the Beech organization. It only takes a walk through the Wichita plants to sense the healthy spirit of teamwork. A pioneer in employe incentive plans, the Beech organization can look back with pride on a record of friendly and cooperative relationship between management and labor.

With a backlog of more than $113 million as of April 1 — an increase of 36 per cent over the backlog of a year ago — and with a diversification of production that guarantees continued growth under any and all circumstances, with plans for a new 1960 executive transport well along, the future looks bright for Beech and all the Beechcrafters.

The entire aviation industry, including the competitors, salute Olive Ann Beech and her 8,000 men and women on their Silver Anniversary!

Gambling With Airlift

IN a speech before aviation writers at the National Press Club in Washington last month, Del Rentzel, chairman of the board of Slick Airways, offered a solution to the generally accepted proposition that this nation's plans for airlift in time of national emergency are woefully insufficient.

Rentzel suggests that a permanent working conference be established between the Military Air Transport Service and the airline industry to draft practical means to expand the Civil Reserve Air Force Plan and work toward aircraft of logistics type which can be used by airlines and the military on an economically sound basis. He suggests a system of expanded use of civil air carriers by annual steps until at least 50 per cent of the military transport requirement moves in commercial aircraft. Constant modernization of the commercial logistics fleet would result from this approach.

A program of joint procurement by

(*Continued on page 60*)

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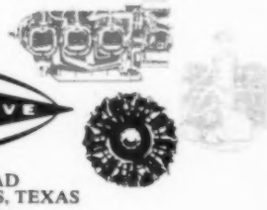

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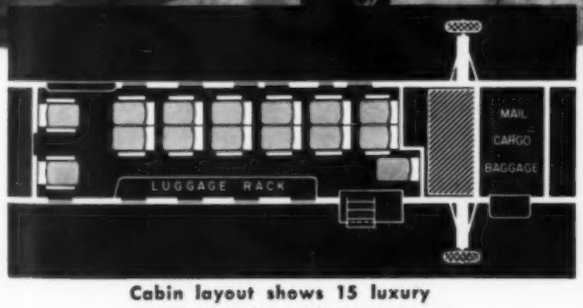

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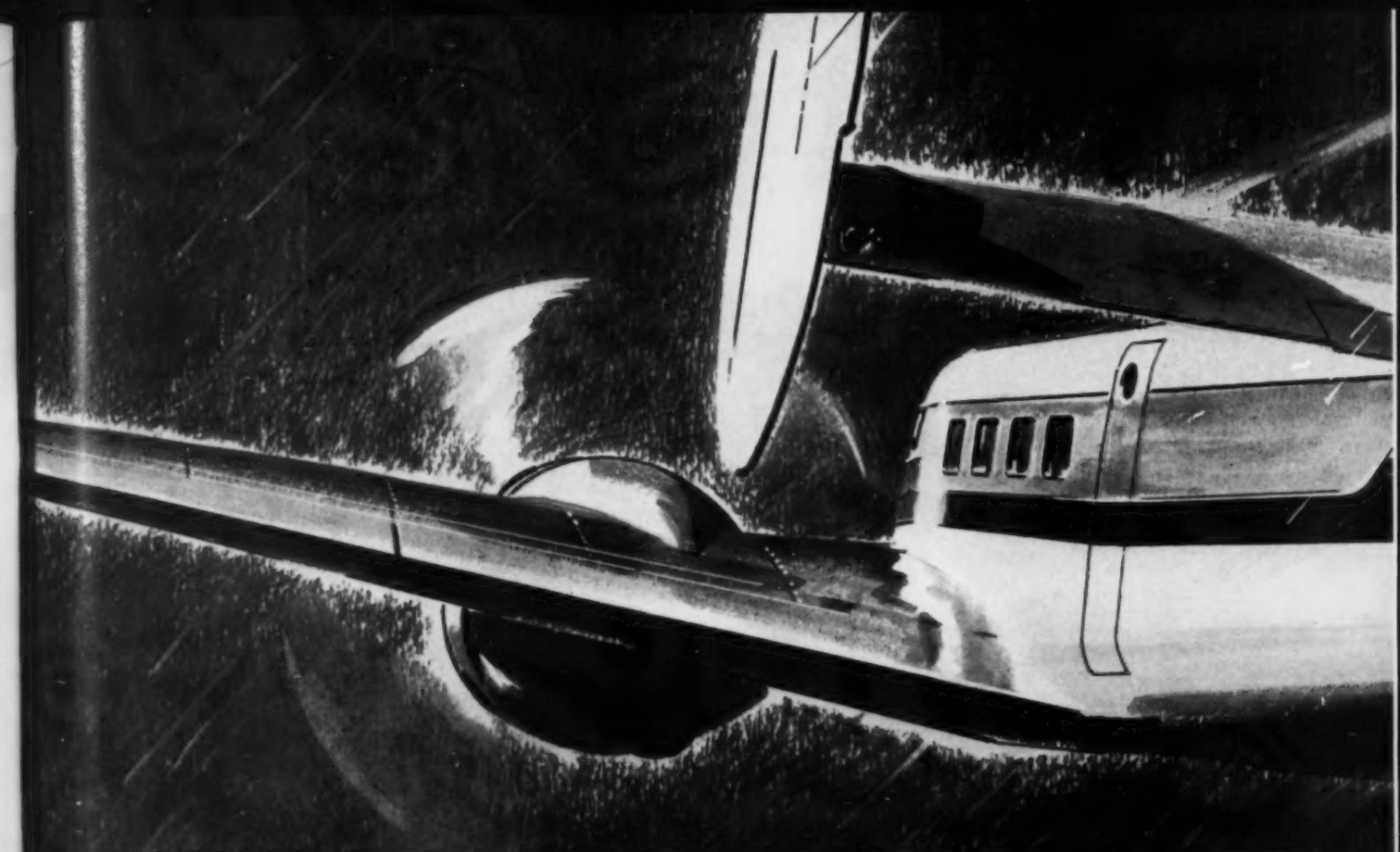

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General Aviation Facilities Requirements Survey

A report to the President's Special Assistant by the General Aviation Facilities Planning Group

Part 1

Composition Of General Aviation Today

EDITOR'S NOTE: The above-titled special report to President Eisenhower's special assistant for aviation facilities planning, Edward P. Curtis, holds such significance in the broad field of general aviation that FLIGHT MAGAZINE is publishing its full text. This survey of general aviation requirements was prepared and submitted by the General Aviation Facilities Planning Group, in which eleven national organizations banded together to document the important and growing field of general aviation (as distinguished from airline and military aviation). Special credit goes to them for the report, and to the well-known firm of Booz, Allen & Hamilton, which coordinated and directed the research studies.

GENERAL aviation today includes the activities of a wide variety of airspace users flying a wide variety of aircraft. These vary from the airline-type transports owned by large corporations and used for the transportation of their personnel, to the two-place, Cub-type trainer rented by the week-end pilot who flies for the sheer pleasure of being in the air. In between, there are the flying physicians, the farm equipment parts salesman, the charter operator, the highway contractor and a host of others with their light single-engine and twin-engine business planes, and the crop applicator with his agricultural airplane. Each of these fliers has his own peculiar requirements for equipment and his own peculiar purpose and pattern of usage of this equipment. The purpose of this chapter is to define general aviation activity in static terms, giving a complete picture of the general aviation fleet as it exists today and the purposes for which these aircraft are used.

At the outset, it is well to point out the dilemma in which the general aviation forecaster has found himself since the first attempt to forecast years ago.

Traditional data stress the composition of the general aviation fleet by types of aircraft and, therefore, are generally a performance classification. This is convenient and valid for the purpose of general aviation facilities planning inasmuch as the facilities must accommodate the performance characteristics of the aircraft itself quite apart from any consideration as to who owns the aircraft and for what purpose it is being flown.

However, the forecast of future growth of general aviation must be based upon the expectancy of various types of aircraft uses and conditioned by the economic resources of the owner. It is in precisely this area that research has been extremely limited until the past two or three years.

Our general problem, therefore, is to break down the general aviation fleet into two basic classification patterns, the classification by performance and the classification by usage and ownership, and then to devise a means for cross-translation between these two patterns of classification. These two classification categories will be used repeatedly for the presentation of data throughout this report.

Five Performance Classifications

The aircraft flown by general aviation may be grouped into five classifications according to the performance characteristics of aircraft.

Class I Aircraft are defined as those relatively large, multi-engined aircraft in use by general aviation for any purpose, having a total rated horsepower from all engines in excess of 750 hp.

Class II Aircraft are defined as light, twin-engine aircraft having a total rated horsepower from both engines of 750 hp. or less.

Class III Aircraft are defined as single-engine aircraft, three-place and over.

Class IV Aircraft are defined as single-engine aircraft, one- and two-place.

Class V Aircraft are in the helicopter classification.

The performance envelopes of these five classes are presented in Table 1. These performance envelopes are the

Table 1

PERFORMANCE CHARACTERISTICS BY AIRCRAFT CLASS

Class of Airplane (Type)	Cruising Speed (mph.)	Stalling Speed (mph.)	Gross Weight (Lbs.)	Take-off Over 50-ft. Obstacle (a) (Ft.)	Range (Miles)	Service Ceiling (Ft.)	Rate of Climb (Ft./Min.)
I (Large multi-engine)							
Maximum	315	100	50,000	4,700	3,000	30,000	2,500
Minimum	180	85	9,300	1,540	1,100	23,000	1,500
II (Light twin)							
Maximum	210	70	6,300	1,400	1,300	22,000	3,000
Minimum	150	52	3,100	1,000	750	18,500	1,200
III (Single-engine, 3 place or more)							
Maximum	190	57	3,000	1,650	1,000	20,000	1,300
Minimum (b)	100	49	1,800	900	410	12,500	700
IV (Single-engine, 1 or 2 place)							
Maximum (c)	230	66	5,500	2,200	NA	17,500	1,250
Maximum (d)	130	45	2,000	1,000	550	19,000	1,000
Minimum	90	38	800	600	350	12,800	400
V (Helicopters)							
Maximum	140		33,000		500	——	——
Minimum	60		2,300		90	——	——

(a) Take-off over 50-foot obstacle equivalent to same landing measurement. (b) Does not include Custer Channel Wing, Helio Courier and similar designs. (c) Maximum including dusters, sprayers, etc. (d) Maximum excluding dusters, sprayers, etc. Editor's Note: Light twins with supercharged engines exceed the figures given.
Source: Aircraft Manufacturing Companies.

highest and lowest figures for each selected performance characteristic of all specific types of aircraft included in each category. Where unusual performance characteristics peculiar to a single aircraft type exist, and that type is in extremely limited usage, these exceptional performance characteristics have been omitted.

58,000 Active Aircraft

About 58,000 active aircraft are in today's general aviation fleet. Based upon records of January, 1956 (the base date used throughout this report as a common time point of reference), the breakdown of these aircraft by performance classification is given in Table 2.

Table No. 2
NUMBER OF AIRCRAFT BY CLASSES
January 1, 1956

Aircraft Class	Certified Airworthy	Registered Aircraft	Inactive Aircraft
I	1,630	1,909	279
II	1,525	2,204	679
III	22,545	27,326	4,781
IV	31,623	48,513	16,890
V	256	306	50
Total	57,579	80,258	22,679

Source: Civil Aeronautics Administration.

It should be noted that the figures for total registered aircraft include all general aviation aircraft believed to be in existence today. Many of the registered inactive aircraft are, perhaps, flyable but are inactive for a variety of reasons. In any event, they do not have current airworthiness certificates.

For our purpose we are interested only in airworthy aircraft. These are the planes which are flown or can be flown immediately and which generate the demands upon our facilities today and will generate the demands for the future. Throughout this report, all further references to the active general aviation fleet will refer to the certificated airworthy aircraft.

Classification by Usage

The pattern of usage to which general aviation aircraft are put is a major factor in developing forecasts of the future of general aviation activity. No attempt is made at this point to go into precise statistical detail as to the usage of the present fleet, and, indeed, such detail is hard to come by. The three accompanying tables do, however, give a good summarized picture of the pattern of primary use of the aircraft in the general aviation fleet.

These tables allocate individual aircraft according to the primary use to which each aircraft is put. They do not go into the matter of the nature and extent of minor uses to which each aircraft is put.

The presentations are based upon sample of over 1,000 aircraft, which sample is statistically representative of the make-up of the active fleet today. The tables represent an extension of the sample ratios to the total fleet of approximately 58,000 planes. As such, these tables must be regarded as estimates which serve very well to show the pattern of usage, although specific figures decrease in validity in the smaller aircraft groups in the tables. Our concern is with the major elements of usage which largely control the over-all facilities requirements posed by the general aviation fleet.

It is worth mentioning that the total estimates here presented are generally in keeping with other partial estimates of usage made by other sources.

The usage pattern shows a distinct relationship to the class of aircraft.

As would be expected, the primary purpose for which the aircraft is used exerts a controlling influence upon the type of aircraft selected. In Table 3, aircraft Classes I and II are combined, since their over-all pattern of usage is similar and the extension of the sample to the total fleet estimate is statistically more valid. Class I and II aircraft show a predominant usage for business or commercial purposes. Class III and IV aircraft have a large business and commercial use, but the personal non-business usage becomes an important factor.

Ownership supports this usage pattern.

Looking to the type of owner of each aircraft, regardless of what his primary use may be, we find a pattern substantiating the usage pattern developed above.

Table 4 clearly shows one of the more troublesome areas for analysis in the individual ownership column. In many cases, particularly in the higher performance aircraft, the individual ownership represents a proprietorship operating the aircraft for business purposes, whereas individual ownership in the lower performance category is more truly ownership by an individual for individual usage — this primary usage perhaps being for business purposes or for pleasure.

Allowing for this situation, we see that the great majority of Class I and II aircraft are owned by companies or businesses, thus confirming the pattern in the previous table.

An analysis of primary purpose of usage by type of owner demonstrates that individuals own aircraft for a variety of primary purposes.

Table 5 estimates the fleet according to each owner's primary use.

These figures support the expected fact that when a plane is owned by a company or a business, it is used primarily for business and commercial purposes. Approximately one-half of the individually owned aircraft are also stated to be operated primarily for a business or commercial purpose, with the other half having a primary purpose of personal transportation, including flying for pleasure.

A further analysis of the individual ownership pattern (not presented here) supports the earlier comment that business or commercial usage of individually owned aircraft increases with higher performance aircraft, while nonbusiness flying increases

Table 3
PRIMARY PURPOSE OF USAGE BY AIRCRAFT CLASS

Aircraft Class	Number of Airworthy Aircraft	Business Transportation	Passenger and Cargo for Hire	Patrol and Survey	Personal Nonbusiness	Instruction and Miscellaneous
I and II	3,160	70%	17%	1%	10%	2%
III	22,550	56%	6%	1%	32%	5%
IV	31,600	26%	4%	1%	52%	17%
V	260	7%	14%	43%	36%	....

Source: Aircraft Owners' Survey.

Table 4
TYPE OF OWNERS BY AIRCRAFT CLASS

	Number of Airworthy Aircraft	Company	Business (Aviation)	Individual	Club
Aircraft Class I	1,630	43%	24%	33%	*
Aircraft Class II	1,530	45%	30%	25%	*
Aircraft Class III	22,550	21%	10%	67%	2%
Aircraft Class IV	21,600	4%	21%	72%	3%

Source: Aircraft Owners' Survey.
*Less than 0.5%.

Table 5
PRIMARY PURPOSE OF AIRCRAFT USAGE BY TYPES OF OWNERS

Type of Owner	Business Transportation	Passenger and Cargo for Hire	Patrol and Survey	Personal Nonbusiness	Instructional and Other
Company	92%	4%	*	3%	1%
Individual	42%	2%	*	52%	4%
Business (Aviation)	9%	34%	4	5%	48%
Club	21%	*	*	37%	42%

Source: Aircraft Owners' Survey.
*Less than 0.5% of total.

Table 6
INSTRUMENT, COMMUNICATION AND NAVIGATION EQUIPMENT BY CLASS OF AIRCRAFT

	Per Cent of Aircraft Equipped with Each			
Aircraft Class	**I**	**II**	**III**	**IV**
Instruments for CAA IFR Conditions	100	86	58	20
Radio Receiver	100	100	91	64
Radio Transmitter	100	100	91	54
Auto Pilot	39	19	7	3
Manual Direction Finder	15	10	16	9
Automatic Direction Finder	72	62	23	5
VOR	87	81	51	14
DME	2	*	*	*
ILS Localizer	67	57	18	4
ILS Glide Slope	55	10	3	*
Airborne Radar	5	5	*	*

Source: Aircraft Owners' Survey.
*Indicates less than .5% of aircraft reported such equipment.

sharply as we move into the lower performance ranges.

Summary of Fleet Usage Today

In summary, the primary purposes for which aircraft are stated to be used appear about as follows:

Business Transportation: The total estimated fleet of planes whose primary purpose is for business transportation is 23,000. While the major share of these planes are in Classes III and IV, a more significant fact is that business transportation usage dominates the aircraft fleet in Classes I and II. Class III also supplies a large number of planes for business transportation and Class IV supplies a surprising number, but in both of these classes other uses are important.

Without prejudicing the statistical results of any forecast, it can be pointed out that the field of business transportation seemingly affords the greatest economic resources to purchase and operate aircraft. These aircraft are generally in the higher performance brackets and these planes probably have reason to be flown more hours than the average of the fleet. Therefore, relative to their actual numbers the higher performance business transportation airplanes generate a greater load than might be expected on aviation facilities.

Passenger and Cargo Transportation for Hire: This fleet is composed of aircraft in all classes, although there is again a heavy bias toward the Class I and Class II aircraft. This underscores the fact that this area of air taxi and cargo usage is for all practical purposes an extension of the business transportation field and feeds upon the same economic need.

Patrol and Survey: The types of aircraft in the group are generally peculiar to the specific usage. For example, the heavier Class I aircraft are used in mapping and survey work where long distances are involved, heavy equipment is required, or where extreme stability is required for photographic mapping. Other types of survey work and patrol work are largely done by the more economically operated Class III and IV aircraft. Almost one-half of the general aviation helicopter fleet is engaged in patrol work.

Instruction and Miscellaneous: Somewhat less than one-half of the planes in this category are used for instruction and the dominant share of these are in Classes III and IV. The aerial application fleet is approximately the same size as the instruction fleet. It is made up of these kinds of aircraft — converted military trainers, specially designed and constructed aircraft, and modifications of standard aircraft — the last being almost all in Classes III and IV. The remaining planes are used for a variety of assignments which call for aircraft from each of the classes.

In total, these business and commercial usages account for approximately 34,000 aircraft in the fleet — taking the lion's share of Class I and Class II aircraft and about two-thirds of Class III aircraft. On the record there seems no denying the fact that the general aviation fleet today is dominated by aircraft used for business and commercial purposes and that the effect of this usage is even more critical since these planes are in the higher performance categories and, as will be shown later, spend more time in the air.

Nonbusiness Flying: About 24,000 aircraft are flown primarily for nonbusiness purposes including personal transportation, recreation, pleasure, and sports flying, most of them in Classes III and IV. This flying is an important aspect of flying to the individual owner, many of whom do considerable nonbusiness flying although they may have listed their primary purpose of plane ownership as a business or commercial purpose. The mere number of 24,000 planes identified as primarily flown for personal usage thus presents a conservative picture of the load put upon aviation facilities today by the man who flies for sport or recreation to evade the crowded highways in his nonbusiness travel, or to extend the geographical range of his recreational activities.

These purpose-of-use classifications will be pursued throughout the report and form an important basis for projections of future aircraft fleet size and characteristics.

Usage Affected by Equipment Carried

Quite apart from the inherent performance characteristics and capabilities of the individual aircraft is the fact that certain auxiliary equipment is required within the aircraft if it is to achieve its ultimate usability. The installation of this equipment in the planes depends upon a number of factors, among the most important of which are:

Cost within the financial means of owners.

Pilot qualifications and training to make use of the equipment.

Weight and cubage requirements of equipment.

Aircraft usage actually requiring equipment.

No effort is made at this point to evaluate the degree to which these factors have affected the installation of equipment nor to rank them in the order of their importance. However, the over-all effect of these and other influences is clearly shown in Table 6, which presents the types and quantities of auxiliary equipment found in each classification of aircraft.

A glance at this table confirms the fact that Class I aircraft are by and large equipped in a manner reasonably equivalent to scheduled air transport aircraft. Class II aircraft have a remarkable amount of equipment, and taken with Class I aircraft, it may be stated that a high percentage of these planes are equipped for flying under almost all kinds of conditions. In Class III we find considerable equipment installations, indicating that over half of Class III aircraft are generally adequately equipped for instrument flying. Although the figures are not presented here, the statistics show that this availability of equipment in Class III aircraft is especially true in those used for business and commercial purposes. Class IV aircraft have a surprising equipment availability, although this class, of course, includes aircraft used for instruction which may be instrumented.

Viewing this equipment pattern in the general aviation fleet, the question immediately arises as to whether or not the aircraft fleet today is not equipped beyond the general level of pilot competence available to the fleet — especially with Class III aircraft.

It may well be that the operational potential of the present fleet is therefore substantially greater than that demonstrated in the statistics — limited as these operations are by pilot limitations.

A sound point to be noted is the tremendous investment in the fleet today in auxiliary equipment. This investment is conservatively estimated on the order of magnitude of $100,000,000 on the basis of replacement cost — an investment not to be lightly thrown aside by the individual owners.

Over 200,000 Active Pilots

Although there are approximately 644,000 certificated pilots, only about 217,000 of these pilots have current medical certificates. If we exclude the approximately 8,000 airline pilots and co-pilots, we have a general indication of the size of the active pilot group flying general aviation's planes. At the end of World War II, returning military pilots were given civilian pilot certificates. This accounts for a large number of certificated pilots, many of which are no longer active. The number of current medical certificates is the real measure of the number of active pilots. The primary ratings of these pilots are as follows:

Air transport	3,800
Commercial	73,000
Private	132,000
Helicopter	100
Total	208,900

These are their primary ratings, in addition to which many of these pilots have additional ratings:

Instrument	23,500
Flight instructor	28,000
Helicopter	3,000

To the total figures should be added approximately 80,000 certificated student pilots.

It is to be expected, however, that the level of piloting activity varies sharply among these 209,000 pilots and the 80,000 student pilots, It is important, therefore, to determine as well as possible by whom most of the general aviation piloting is actually done.

Owner and "Regular Pilot" Ratings: One way to approach the problem is an analysis of the ratings of individual aircraft owners or the ratings of their regular pilots, since these persons should be expected to account for a large share of piloting hours and their rating pattern is therefore more meaningful. The primary and additional ratings of this aircraft owner and regular pilot group are shown in Table 7.

It is immediately seen that the superior performance capabilities of the Class I and Class II planes are supported by the capabilities of their regular pilots. Seventy per cent of the men doing most of the piloting of these planes have ratings beyond that of private pilot. Thirty-five per cent of the pilots hold an additional instrument rating, these ratings being mainly held by private and commercial pilots. Including the airline transport ticket holders as competent instrument pilots, we have approximately 60 per cent of the regular pilots of Class I and II aircraft holding their instrument ratings. While this percentage is somewhat lower than the percentage of the Class I and II aircraft having IFR capabilities, it is nevertheless substantial and indicates a strong feeling — supported by practice — that in today's general aviation picture getting the most utility out of the bigger and faster planes requires advanced pilot capabilities.

This situation is reversed in the case of Class III and IV planes, where we find 60 per cent of the regular pilots holding only a private rating, with relatively few instrument ratings held by either private or commercial ticket holders. This is a significant point when matched against IFR capability of Class III aircraft, especially, where 58 per cent of the aircraft are equipped for IFR conditions. In this large class of aircraft, it seems apparent that the actual equipment capabilities substantially outrun the capabilities of the regular pilots of these aircraft.

The ratings of pilots in all classes of aircraft doing local or cross-country flying during the two-day operation survey further point out the fact that the more highly rated pilots do the cross-country flying. Table 8 presents a breakdown of the ratings of those pilots interviewed during the two days of the survey in the Chicago hub.

Again it is seen that in Class I and II aircraft, most of the piloting on these two days was done by pilots holding advanced certificates — with almost all of the cross-country flying of these classes of aircraft being done by commercial or airline transport rated pilots. The case is not quite as clear for Class III and IV aircraft as would be expected, since the majority of the regular pilots of these classes of aircraft are private pilots.

Hired professional pilots fly the high performance aircraft: The professional nature of the piloting of Class I and II aircraft is strongly shown in Table 9.

Table 7

PILOT RATINGS OF OWNERS, OR THEIR REGULAR PILOTS BY CLASS OF AIRCRAFT

Aircraft Class	Primary Ratings: Airline Transport	Commercial	Private	Student	Additional Ratings: Instrument	Flight Instructor
I and II	26%	44%	30%	0%	35%	37%
III	1%	34%	60%	5%	15%	14%
IV	1%	24%	61%	14%	21%	10%

Source: Aircraft Owners' Survey.

Table No. 9

HIRED PILOTS BY AIRCRAFT CLASS

Aircraft Class	Per Cent Hired
I	84
II	91
III	19
IV	22
Total	31

NOTE: Class IV aircraft show a higher percentage of hired pilots than Class III because of instructional flying. If only local flying were considered, 36% of the Class IV aircraft pilots would be hired.
Source: Aircraft Operations Survey.

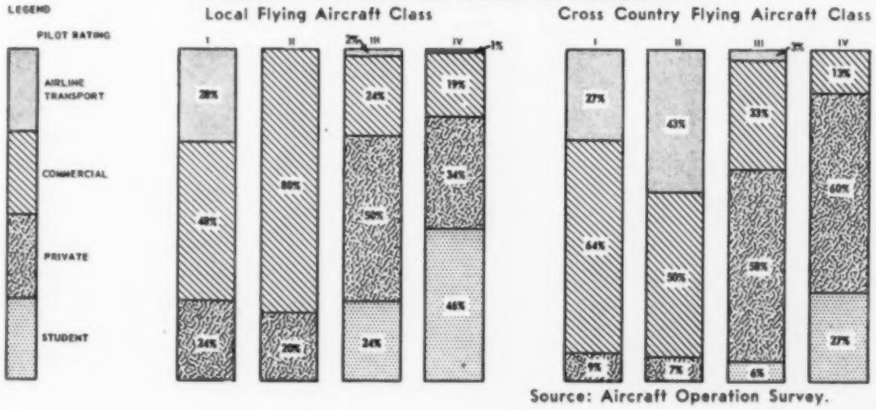
Again we find the strong indications of professional competence deemed necessary to fly Class I and II aircraft. Roughly nine out of ten of the pilots doing most of the flying in these aircraft are professional pilots employed for this purpose. These are the pilots with the advanced ratings.

Again the picture reverses sharply with Class III and IV aircraft, where the incident of personal piloting is greatest.

In summary, it may be remarked

Table 8

RATINGS OF PILOTS BY CLASS OF AIRCRAFT



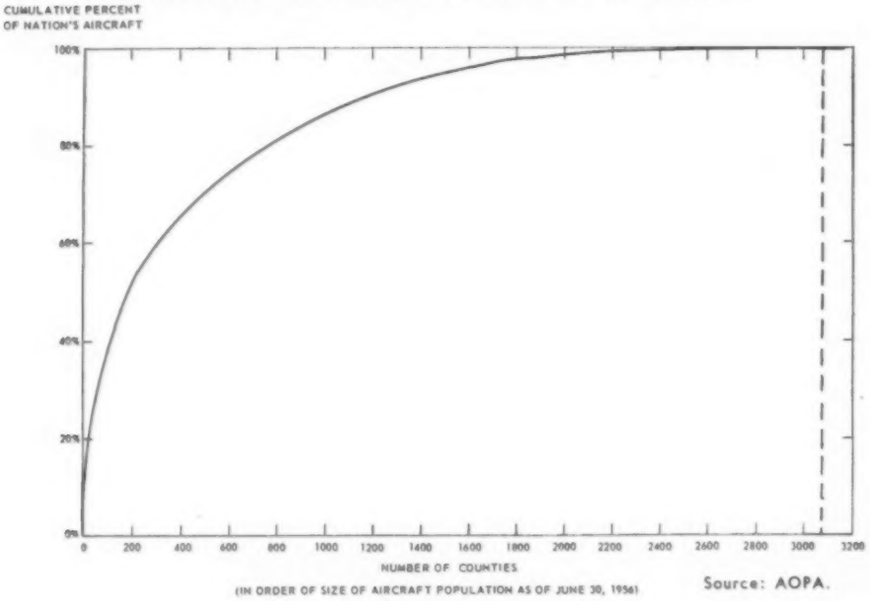
Source: Aircraft Operation Survey.

Table 10
GEOGRAPHIC DISTRIBUTION OF GENERAL AVIATION AIRCRAFT

MORE THAN 42 AIRCRAFT/1000 SQ. MILES
BETWEEN 17 AND 29 AIRCRAFT/1000 SQ. MILES
BETWEEN 9 AND 16 AIRCRAFT/1000 SQ. MILES
LESS THAN 9 AIRCRAFT/1000 SQ. MILES
NOTE:
NOS. OF AIRPLANES PER STATE
SHOWN AS FOLLOWS -
CLASS I & II
CLASS III
CLASS IV

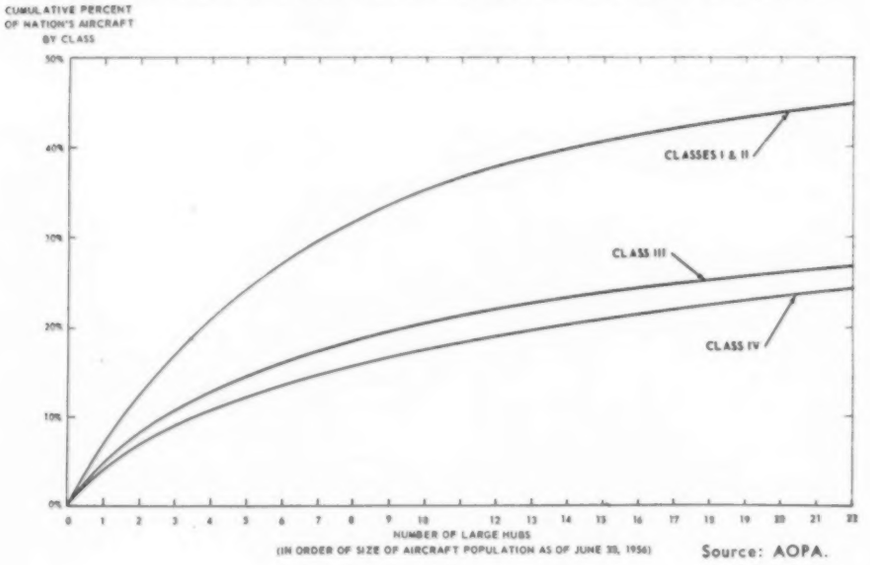
Source: CAA.

Table 11
GEOGRAPHIC DISTRIBUTION OF AIRCRAFT BY COUNTIES



Source: AOPA.

Table 12
PERCENTAGE OF FLEET BASED IN ALL LARGE HUBS BY AIRCRAFT CLASS



Source: AOPA.

that the men doing most of the flying in Class I and II aircraft are highly qualified pilots and as a group appear to be capable of exploiting the full capabilities of the aircraft which they fly. On the other hand, it is readily appearent that a great increase in the utility of the present Class III and Class IV fleet — and particularly Class III — can be achieved if the pilots can be trained to exploit the full capability of the equipment they fly. A question foreshadowed by these observations is, "Is it practical to expect a mass upgrading of pilot competence, or is it more practical to reduce the competence requirements through redesign of equipment and development of new and simplified flight control and navigational systems?"

Widely-Scattered Distribution

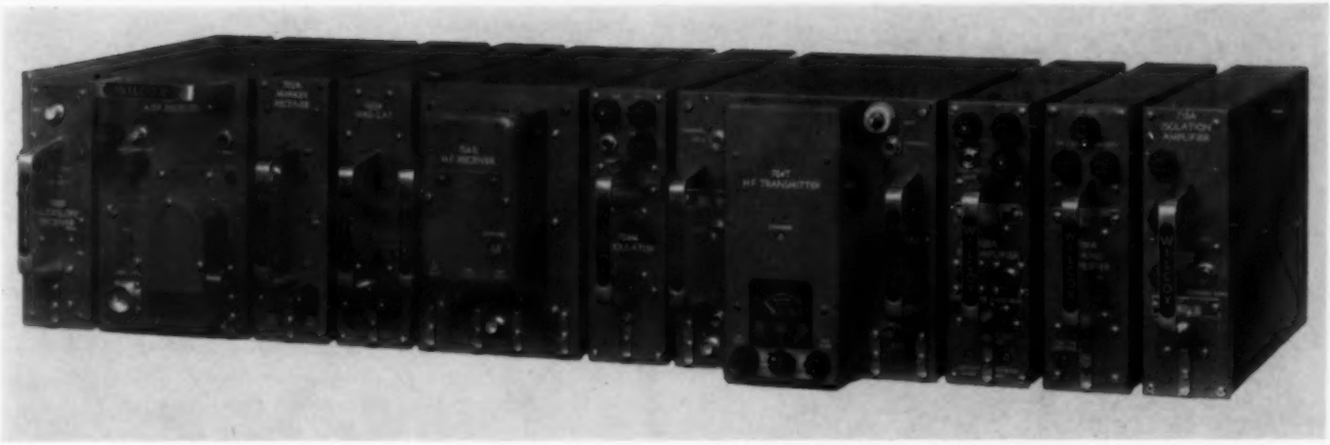
In completing our picture of the general aviation fleet today, it is well to review the base location of these aircraft. It has been repeatedly pointed out that the attraction of aircraft ownership and its utility increases as distances become greater and population more spread out. The number of aircraft per capita is certainly much greater in the relatively sparsely settled sections of the country than in the heavily populated areas (in the state of Wyoming, for example, there are 1.24 planes per 1,000 people, while in the state of Illinois there are only .38 planes per 1,000 people). Such ratios, however, can be misleading. The fact is that this tendency for aircraft ownership to be higher in thinly populated areas is by no means a strong enough tendency to offset the substantial grouping of aircraft around population centers or hub areas.

Table 10 shows the distribution of the general aviation fleet on the basis of aircraft per square mile of territory. The general concentration of aircraft in the more populated regions is clearly observable, and further analysis sharpens this picture of concentration of aircraft in specific urban communities.

Less than 10 *per cent of the counties in the United States have* 60 *per cent of aircraft based within their limits:* A simple distribution chart, Table 11 sharpens our appreciation of the fact that the location of aircraft is far from a general spread across the country.

Looking at the proposition from a slightly different angle, we find that from state to state the majority of the general aviation aircraft are based in recognized hub areas. In fact, 55 per cent of the general aviation fleet

(Continued on page 62)



A typical line-up of Wilcox Canari equipment, from left to right, includes Type 700 ILS glideslope receiver, 701 ADF receiver, 702 marker beacon receiver, 703 Mag Cat (magnetic amplifier computing automatic tracker), 704 HF receiver, 704 modulator for HF transmitter, 704 HF transmitter, 708 public address amplifier, 709 isolation-mixing speaker amplifier and 710 isolation amplifier. Factory Canari installations have included Aero Commanders, Super 18 Beechcrafts and Convair 440's. Others to receive factory installations include DC-6B, DC-7C, DC-8, Super G Constellation, Lockheed Electra, and Fairchild F-27. —(Wilcox Photo.)

Airline Equipment For Business Planes

Miniaturized radio halves rack space and cuts weight by two-thirds

By TOM ASHLEY

IT used to be that business airplane owners and operators looked up the scale to airline-type communications and navigation equipment as a far-off objective virtually impossible of achievement for their own usage. No matter how much they were prepared to invest in top quality equipment and dualization for maximum dependability and utilization, their business planes just didn't have the space or payload to spare. As a consequence, anything smaller than a Lodestar or DC-3 was forced to carry something less than desirable and generally the radio-electronic package has had to be a motley assortment of equipment makes and grades, the components located from nose to tail and so strung out that special engineering and modifications were usually necessary.

All this is now being changed so that airline communications and navigation equipment can be installed in business planes well below the Lockheed and Douglas categories in weight and space availability. Just when the medium and light twin-engine business planes of new design are becoming most popular, airline-standard radio and navigation equipment has been miniaturized so that these smaller business aircraft can carry the finest installations, just as the very large airliners do.

The first complete package installation to pioneer this revolutionary development is the Wilcox Canari System (Canari stands for communications and navigation airborne radio instrumentation). In one long stride, Wilcox developed not two or three pieces of equipment but some 14 different equipments — all simultaneously — to give the smaller airplane a full range of airline equipment coverage.

The impact of this miniaturization is most obviously seen in the Wilcox figures which show that the Canari System (a) cuts space needs more than half, (b) weighs only one-third as much and even (c) saves up to 500 lbs. on typical airline aircraft.

It is significant that Wilcox did not stop at space and weight reductions. It completed its revolutionary development by engineering and producing factory-built equipment racks, including all wiring, for standardized installations adhering to factory quality-control standards, and even established factory production of complete control panels, including all wiring. Simple plug-in installations became a reality with this.

Thus the Canari System introduces a new concept to aircraft equipment. Wilcox first announced this in October, 1955, but only recently began delivering all of the equipment. It has branch engineering-sales offices working with the airframe manufacturers and has appointed a network of some 35 leading distributors strategically located throughout the country, most of them being prominent sales and service stations representing top business aircraft lines.

Here are the Wilcox Canari System components:

Type 700 Glideslope Receiver — 1/4 ATR case, short length; 8 lbs. with internal dynamotor power supply; 7 lbs. with internal 400 cycle AC power supply; 6 lbs. with external power only; 329.3 to 335 mc. frequency range.

Type 701 ADF Receiver — 1/2 ATR case, short length; 13.5 lbs. with internal 400 cycle AC power supply; 12.5 lbs. with external power only; 4 bands, 90-190 kc., 190-420 kc., 490-970 kc. and 970-1750 kc. frequency range. Control head is 5-13/16-ins. long, 3-3/16 ins. high by 2-3/8 ins. deep, weighs 2 lbs., has edge-lighted plastic panel, stainless-steel ribbon dial with large numbers. Complete installed ADF weight, including receiver, control head and ferrite-core loop, 23 lbs.

Type 702 Marker Beacon Receiver — 1/4 ATR case, short length; 7 lbs. with internal dynamotor power supply; 6 lbs. with internal 400 cycle AC power supply; 5 lbs. with external power supply.

Type 703 Mag Cat Computing Automatic Tracker — 1/4 ATR case, short length; 3 lbs.

Here's Wilcox 728 Canari Control Panel for Beech Super 18, which mounts at instrument panel center. Audio selector switches for pilot and co-pilot are at edges and include range filters for both omni's and ADF. At panel top are marker beacon controls and lights as well as Mag Cat and gyro heading controls. Control for radar safety beacon transponder is between frequency selectors for dual VHF communications (left) and for dual VHF navigation receivers (right). Three-position switch above left selectors permits single- or double-channel-simplexing as well as advance selection. Along bottom are controls for ADF, switch for combination of ADF or omni signals to appear on the RMI, and a front course-back course switch. Light denotes back course selection.
—(Wilcox Photo.)

Type 704R HF Communications Receiver — 1/2 ATR case, short length; 9 lbs. maximum with all 20 channel strips installed; 2 to 20 mc. frequency range.

Type 704T HF Communications Transmitter — 3/4 ATR case, short length; 13 lbs. with all channels activated; 2 to 14 mc. frequency range; 6 basic channels, individually tuned (4 basic channels have provision for a second crystal to be installed without retuning; a maximum of 10 channels is thus available); 50-watt or more output.

Type 704M Modulator for 704T Transmitter — 1/4 ATR case, short length; 5.8 lbs.

Type 705 VHF Communications Receiver — 3/8 ATR case, short length; 9.5 lbs.; 108-135.95-mc. frequency range; 560 channels with 50-kc. spacing.

Type 706 VHF Navigation Receiver — 3/4 ATR case, short length; 13 lbs. with DC output to deviation indicator only, 17 lbs. with optional omni bearing indicator and associated plug-in module; 108-135.95-mc. frequency range; 560 channels with 50-kc. spacing.

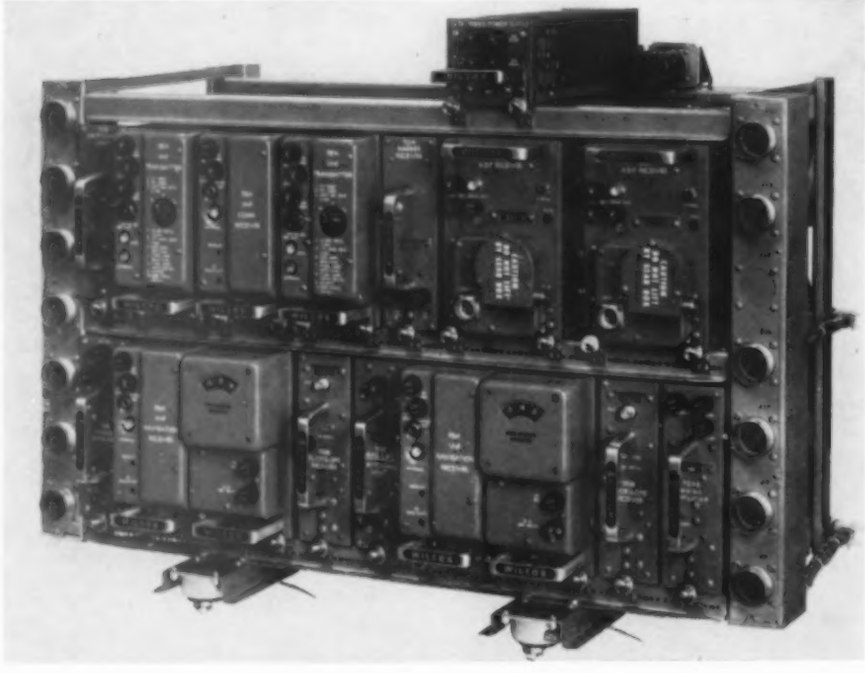
Type 707 VHF Transmitter — 3/8 ATR case, short length; 13 lbs.; 118-135.95-mc. frequency range; 360 channels with 50-kc. spacing; 35-watt output minimum.

Type 708 Public Address Amplifier — 1/4 ATR case, short length; 6.5 lbs.; 15-watt output on 250 volts or 30-watt output on 500 volts on final amplifier tubes; 3 input channels.

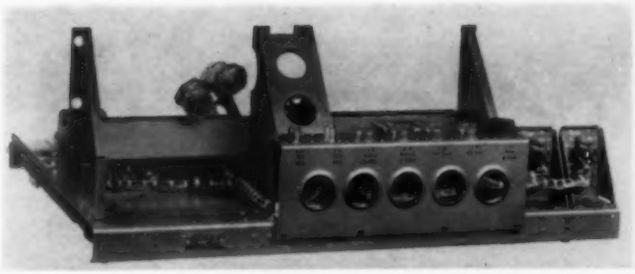
Type 709 Audio Mixing Amplifier — 1/4 ATR case, short length; 8 lbs.; 15-watt output on 250 volts or 30-watt output on 500 volts; 10 input channels, relay type remote control.

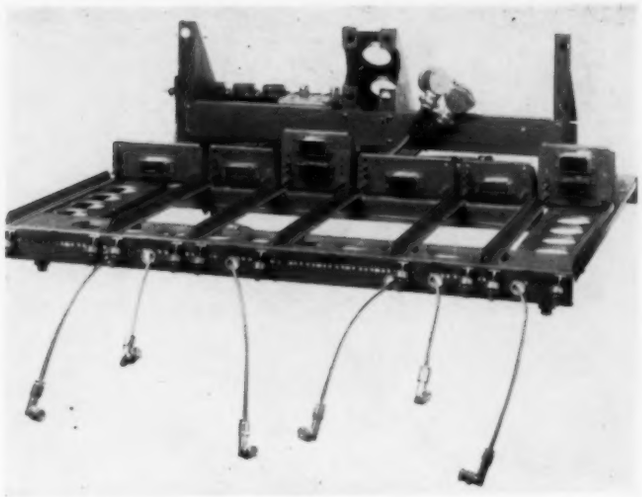
Type 710 Isolation Amplifier — 1/4 ATR case, short length; 7 lbs. with internal dynamotor; 6 lbs. with internal 400 cycle AC power supply; 5 lbs. with external power only; 1 crew interphone channel, 1 to 5 audio isolation channels of module type.

Type 714 Air Traffic Control Transponder — 1/2 ATR case, 20 lbs. maximum; 1030 mc. receiver frequency; quartz crystal receiver frequency control; 1090 mc. plus or minus 2.5 mc. transmitter frequency; tuned cavity resonator transmitter frequency control; provision for 3 interrogation codes with automatically selected replies; the 64 reply codes specified in ARINC Characteristic 532A are provided; additional codes are available without equipment modification since the delay line incorporates 1.45 microsecond spacing; special identification caboose pulse is provided.



This Canari package, complete with wired rack, was designed for Beech Super 18 and is Wilcox-fabricated. Affording dual reliability for IFR operation with certificated equipment, the entire system weighs 250 lbs. including control panel, instruments, power supplies and all cables. Lower shelf (left to right) has pilot's isolation and speaker amplifier, No. 1 omni, No. 1 glideslope, Mag Cat and special omni switching unit, No. 2 omni, No. 2 glideslope and co-pilot's isolation and speaker amplifier. Upper shelf, left to right, has communications switching unit, No. 1 VHF transmitter, VHF communications receiver, No. 2 VHF transmitter, marker beacon, and No. 1 and No. 2 ADF's. Top unit is AC transformer power supply, used when 400-cycle power is available. Second VHF communications receiver can be mounted on this shelf.
—(Wilcox Photo.)





Front (right) and rear (above) views of a Wilcox Canari shelf which fits both the Douglas DC-7 and Convair 440. Note wiring, plug-in units and cables. This shelf is for dual dynamotor power supplies, dual VHF omni's, dual glidescope receivers and units of the Sperry Integrated Instrument System. —(Wilcox Photos.)

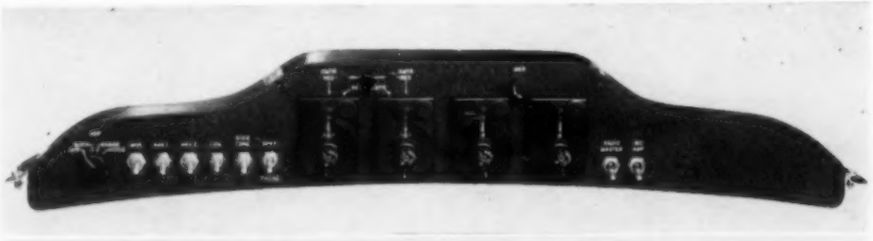
Each of the elements in the Canari System is completely compatible with all the others. All carry CAA type certification or TSO certificates meeting airline performance and quality requirements. Perforated equipment covers are used throughout to step up convection air circulation and new heat-dissipating tube shield is used in conjunction with ARINC, airline-approved miniature tubes. Sealed-type components are used throughout.

Weight and size reductions were achieved by utilization of modern, miniature MIL-approved components, circuit design techniques and special attention to packaging and mechanical fabrication. Gone are the individual shockmounts, the individual power supplies and individual high power audio amplifiers.

Latest of the components to become available in quantity were the navigation receiver and communications transmitter. All of the elements are now available from production.

We visited the Wilcox factory in

(Continued on page 63)



Wilcox-designed-and-fabricated Canari installation for the Aero Commander has four units. At top is glare-shield control panel with audio selectors, dual communications controls with single and double-channel-simplexing switch, dual omni controls, marker beacon controls and radio master and isolation amplifier controls. Center photo shows No. 1 shelf, located aft of baggage compartment and containing two omnis and glideslope receiver; with space for second glideslope or any other 1/4-ATR unit. Shelf No. 2 (bottom right) has two communications transmitters, a communications receiver, communications controller switching unit and an ADF receiver. Shelf No. 3 (below) has marker beacon receiver and isolation-mixing speaker amplifier. —(Wilcox Photos.)

As seen over the right engine nacelle of a Piper Apache, this is Grand Bahama, British West Indies, 72 miles east of Palm Beach, Florida. West End Airport is only half a mile from Grand Bahama Club (foreground).

—(Piper Photo.)

Offshore Resort For Airmen

PIPER Aircraft Corporation officials have been conducting a series of regional sales meetings in recent months, going out into the field with their distributors and dealers rather than calling all of them into the factory at Lock Haven, Pennsylvania. For the Southeastern area, C. W. (Bucky) Taylor, factory district manager, organized a unique program which took 106 distributor and dealer personnel in their demonstrators to foreign soil — believed to be the first meeting of American business plane dealers ever held outside of the United States.

Business planes which took gathering across Gulf Stream to Grand Bahama, were cleared through Red Aircraft Service (below), Piper dealer at Ft. Lauderdale, Florida. By the pool, left to right, are Bill Strohmeier, W. T. Piper, Jake Miller and Wally Smith, all of Piper, and Narco's Jim Riddle, standing.

—(Piper Photos.)

Seventeen of the 22 Piper Apaches which flew to Grand Bahama are pictured here, with an executive DC-3 and other aircraft.
—(Piper Photo.)

Site of the sales meeting was Grand Bahama Island, located 71 miles east of Palm Beach, Florida, in the British West Indies. The three-day sessions not only accomplished the factory's purpose of intensifying Piper sales but proved a dramatic demonstration of the private airplane's flexibility as a dependable means of transportation for business and pleasure.

Twenty-two twin-engine Piper Apaches plus half a dozen Piper Tri-Pacers flew the gathering across the Gulf Stream on the short ocean hop to the island resort, which is about 50 miles north of Bimini. They found Grand Bahama's West End Airport in good shape and were guests at the Grand Bahama Club. As the accompanying pictures show, here's an attractive pleasure spot with many activities and conveniently-located haven for business planes and their passengers.

On the business program were W. T. Piper, president of the firm; J. W. Miller, general sales manager; W. C. Smith, assistant general sales manager; Roland Boardman, service manager; Bill Strohmeier, public relations counsel, and others. Leo Williamson of Lycoming was toastmaster at the meeting's main banquet, and Narco, Aircraft Investment Corporation and American Mercury Insurance Company were hosts at several social functions.

Piper's share of the business flying sales market was reported to be increasing and officials viewed 1957 prospects with optimism. Figures released later show that Piper sales increased 22 per cent during the 6 months ended March 31, 1957, over the same 1956 period, totaling $14,455,816 as compared to $11,806,599. During this period, Piper delivered 1,248 business planes, representing 42.5 per cent of the total volume of business aircraft delivered during the period by all manufacturers reporting to the Aircraft Industries Association. Sales for March, 1957, topped the $3,000,000 mark to set a new record any single month in Piper's 29-year history.

The aviation outlook as seen from the poolside by Lycoming's Leo Williamson, left; Bill Piper, the manufacturer, and Finance Man Ben MacAndrews (right) of Aircraft Investment Co. —(Piper Photo.)

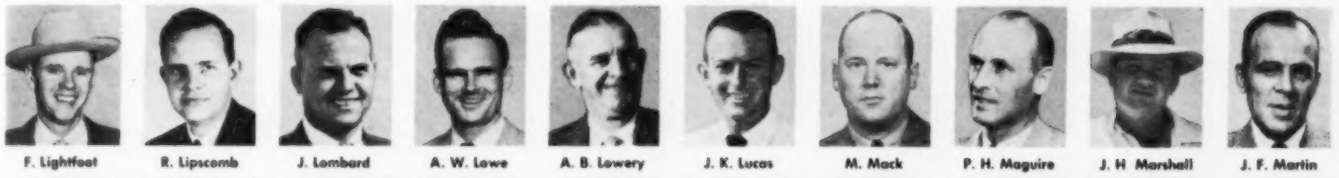
Two groups (right) among the 106 distributor-dealer personnel attending Piper's Grand Bahama sales conference included (top, left to right) Mary Louise Northington, Mary Alice Brugh, Ken Brugh of Greensboro, N. C., Bob Northington of Winston-Salem, N. C., and C. W. Taylor of Piper. Bottom picture (left to right) shows Mr. and Mrs. Walter Nix of Marietta, Georgia, Mrs. Luther Johnson of Greenville, S. C., and Mr. and Mrs. George Gunn of Lithonia, Ga.
—(Piper Photos.)

AERO COMMANDER proudly presents some of the pilots who fly the

AERO DESIGN & ENGINEERING CO · BOX 118

Commander business fleet

B. Kotteman D. L. Lang G. R. Laure



F. Lightfoot R. Lipscomb J. Lombard A. W. Lowe A. B. Lowery J. K. Lucas M. Mack P. H. Maguire J. H Marshall J. F. Martin

J. Mathews R. C. McAbee H. J. McCallum E. J McCue M. McDowell L. V. McGee C. McKinnon J. P. Meyers A. Meyer H. Meyner

W. J. Miller O. Mills G. R. Morrow R. Morrow G. S. Morse J. Nave G. L. Nelms J. Nelson D. Nemel B. Newman

C. T. Noble D. B. North D. B. Olsen E. Osborn J. W. Owen G. J. Pandapas E. Perchak A. Pinckley, Jr. J. L. Posada R. C. Potter

R. W. Prock B. Redecker F. Reeder E. Reger M. A Renner J. B. Roberts F. M. Robertson C. Robinson D. Robinson M. N. Robinson

F. Rosenstein, Jr. S. S. Roszell, Jr. J. Sawyer B. Seitz C. L. Shade J. A. Shartle J. Skar C. T. Smith W. Smith T. Soper

O. Sorensen A. G. Stamm J. C. Steele C. A. Stephan J. Stephenson B. W. Sumner, Jr. L. E. Surber B. Swanson H. H. Taber H. L. Tamenne

R. Terry M. D. Tipton F. Trott D. O. Turner, Jr. R. Twynham J. W. Tyler F. D. Upchurch R. Vertel J. Vertiz E. W. von Tempsky

R. C. Wearth G. West D. Westfall A. S. Wickstrom W. W. Weir L. J. Willis R. J. Wisnieski A. S. Witchell, Jr. W. O. Wooldridge L. L. Zimmerman

BETHANY, OKLAHOMA — AERO Commander 560-E · 680-SUPER

Heliport is small raised platform on a converted LST at one of Humble Oil and Refining Company's 15 rigs off the Louisiana Gulf coast. Drilling crew going off duty can be seen walking on platform to board helicopter. Humble's copters carried 85,185 passengers last year, will top 150,000 passengers this year—all company employes.
—(Humble Oil and Refining Photo.)

Offshore Helicopter Airlift

COMMERCIAL passenger-carrying helicopters are building more and more impressive operating figures. In 1956, for example, New York Airways shuttled 33,000 passengers between metropolitan New York airports. Linking eight cities in Europe on a much larger helicopter airline network, Sabena Belgian Airlines carried some 34,000 passengers.

But the largest commercial helicopter passenger volume in the world is carried by a private airlift, a corporate aircraft operation of which few aviation people have heard. It is the Humble Oil and Refining Company's offshore airlift based at Grand Isle, Louisiana, on the Gulf of Mexico. Like oil company and other corporate fixed-wing aircraft which shuttle many thousands of business people around the United States and beyond, Humble's helicopters are mistakenly referred to in statistics and industry references as "executive" aircraft. They are actually personnel carriers, for their passengers are working people more than anybody else — hard-working employes.

Last year Humble Oil's private helicopter airline carried 85,185 passengers, dwarfing any other non-military helicopter airlift. This year it will surprise nobody if Humble's helicopters carry more than 150,000 passengers, for its fleet is constantly growing not only in numbers of helicopters but by the addition of larger transport types. For example, two new 12-passenger Sikorsky S-58's were added early this year after the 1956 records had been compiled. They brought to 13 the number of whirly-birds operated by Humble, others being six 8-passenger Sikorsky S-55's and five 3-place Bell Model 47's. The fleet was to grow to 15 as FLIGHT MAGAZINE went to press, with the addition of two more 12-passenger S-58's.

These two new 12-passenger Sikorsky S-58's were added to the Humble fleet last month. Note amphibious landing gear. Range with full load is more than 150 miles.
—(Humble Oil and Refining Photo.)

Mr. Helicopter himself, pioneer Igor Sikorsky, journeyed down to Grand Isle to watch the big copters of his design operate on busy schedules as company airliners. "This," said Sikorsky, whose machines operate all over the globe, "is the outstanding helicopter operation of its type in the world today."

Humble's copters shuttle oil drilling crews between the company's hangar at Grand Isle and 15 Humble offshore drilling rigs which dot the Gulf of Mexico. Some are 35 miles out from land. Time-saving is tremendous by helicopter, one rig being 4 hrs. 30 mins. out by boat but only 35 minutes away by S-55 and 30 mins. by S-58. This saves 48 very costly man-hours on the way out with a fresh crew and the same on the way back with the crew being relieved of duty, when the 12-passenger machine is used. Copters enable the company to spread specialist skills to cover more jobs in a given period of time — District Superintendent I. D. (Slim) Wafer, for example, can cover in 3 hours by company Bell helicopter a

Five three-place Bell Model 47 helicopters in Humble fleet use platforms at company's Grand Isle base to keep tail rotor clear when loading.
—(Humble Oil and Refining Photo.)

route which would require 12 hours by boat.

But the big job accomplished by Humble's helicopters is the shuttling of hard-working drilling crews. These men are oil-field workers, not seamen, and tortuous choppy-water boat rides on the Gulf produce sea-sickness which can be completely disabling. Storms can isolate the drilling rigs, preventing boats from exchanging their crews, without the services of the versatile whirly-birds. But even Hurricane Flossie last year failed to imperil Humble's crews — copters removed them without a hitch.

The fleet of 13 Humble copters has been flown by 21 pilots working for Rotor-Aids, Inc., a contract copter service. Each works an 8-hr. shift four days, an 8-hr. shift four nights and then is off four days. Weather minimums are 3-mile visibility and 500-ft. ceiling, and these occur only about once a month from October through March. Average Gulf of Mexico visibility along the Louisiana coast is only 7 to 10 miles.

They operate under Humble's aviation transportation division, headed by oldtimer Charles M. Scholes of Houston. Flight safety is Humble's uppermost aviation operations requirement. Helicopter crews place prime importance on respecting load limits — every passenger is weighed in, as is every item of cargo, and an extra passenger means an extra helicopter makes the trip. All helicopters are float-equipped for possible emergency landings in water and emergency proficiency is maintained by frequent training, especially in auto-rotation landings with power off. At the helicopter's usual low cruising level of less than 1,000 feet, winds can send fuel consumption soaring, so extra fuel is staked out on the beach between the base and the rigs at about the half-way mark. The 22 mechanics servicing Humble's helicopter fleet give each craft a thorough-going daily examination, as well as routine periodic checks when the time rolls around. Spare engines are on hand for installation should an engine change

(Continued on page 60)

Humble's main heliport at Grand Isle is adjacent to district offices. This helicopter fleet has grown from two machines in 1954 to 15 helicopters at present. Nine are shown in this aerial view, taken at noon. Note four platforms for Bells at far side of heliport.
—(Humble Oil and Refining Photo.)

Built to order for Lindbergh on the Ryan M-1 mail plane design, here's the "Spirit of St. Louis" before first test hop at San Diego. With 223-hp. Wright Whirlwind engine, it had 319-sq. ft. wing area and grossed 5,250 lbs. including 450-gal. fuel supply for 4,110-mile range. (Ryan Aeronautical Photo.)

How Lindbergh Got His Ryan

BEHIND Charles A. Lindbergh's epoch-making New York-Paris solo hop thirty years ago this month on May 20, 1927, was a saga of aircraftmanship in the ambitious shop of Ryan Airlines, Inc., at San Diego, California, which T. Claude Ryan and his associates still recall vividly.

Ryan, who founded Ryan Airlines in 1922 but sold out to his partner, B. F. Mahoney, late in 1926, was manager when his secretary, Georgia Mathias, handed him a telegram from Lindbergh on February 3, 1927. This was the message: "Can you construct Whirlwind engine plane capable of flying nonstop between New York and Paris. If so please state cost and delivery date."

Mahoney was out of town but Ryan did some rapid calculations with the company's first full-time engineer, young Donald Hall, who had been hired only a few weeks before, and sent back to Lindbergh the following telegram: "Can build plane similar to M-1 but larger wings capable of making flight. Cost about six thousand

(Continued on page 60)

Top picture at left shows Lindy's Ryan during fuel-loading tests, the six 50-gal. drums representing only two-thirds of the plane's capacity. That's Lindbergh on center drum at bottom. Lower photo was made minutes before Lindbergh left the factory for St. Louis. H. J. van der Linde, now Ryan factory manager, is shown atop wing. Others, left to right, are O. R. McNeel, welding foreman; George Hammond, student-mechanic-pilot; Lindbergh; Donald Hall, chief engineer, and the late A. J. Edwards, Ryan sales manager.
—(Ryan Aeronautical Photos.)

"General's Jeep"

The Beaver L.20 has proved ideal for the movement of high ranking Officers into forward battle areas.

With 6 passengers, or a half ton of payload, and full tanks of fuel, the Beaver is airborne in less than 600 feet. (Clears 50 foot obstacle in 1000 feet).

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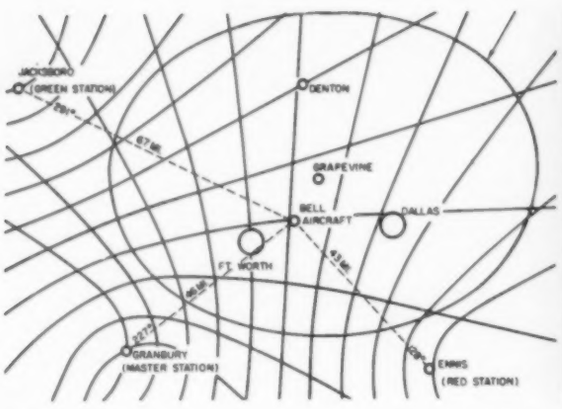


Bell-Bendix-Decca system ground transmissions form grid lines which give a pattern of lanes (map). Decometers aboard helicopter divide these lanes into hundredths for simple navigation. Bell 47 is shown making pin-point landing approach in a remote patch surrounded by trees. —(Bell Map and Photo.)

Instrument Flight Reality For Copters

A SELF-CONTAINED instrument landing system for helicopters has been achieved by Bell Helicopter Corporation and Bendix Aviation Corporation's Pacific Division, opening the door to helicopter instrument flying and precision take-off, navigation, letdown and landing under instrument conditions.

Dramatic flight demonstrations of the new development were staged last month at the Bell factory near Fort Worth, Texas, for civilian and military experts. They climaxed a year of experiments conducted jointly by Bell and Bendix, during which two Bell Model 47's were equipped with special devices utilizing a Bendix-Decca navigation system in which was installed a commercial Decca chain of a master ground transmitter and two slave stations.

Primary goal of the project was to devise a means by which helicopters can operate safely and with dependable regularity in and out of remote areas, pinpointing their position at all times while flying, maneuvering, hovering or landing in darkness or under instrument conditions. Success in the undertaking was described by Harvey Gaylord, president of Bell Helicopter Corporation, who said repeated blind flight demonstrations of accuracy "dramatically prove the helicopter can now make fuller use of its unique flying abilities regardless of weather and visibility."

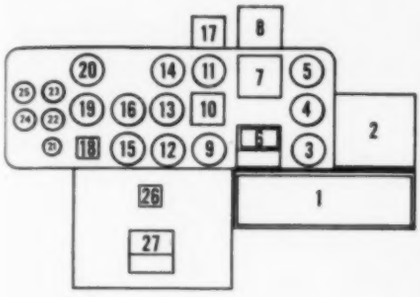
The equivalent of an "electronic road map" for low-flying copters, to which conventional VHF omni-range line-of-sight navigation is virtually useless, is the key to the new system. It is provided by the low-frequency Bendix-Decca navigation system, perfected in England, widely used in Europe and licensed to Bendix in the United States. Three ground radio transmitters — a master with two slaves — are located in a triangular arrangement in the Fort Worth-Dallas area. They transmit a pattern of stationary waves which occupy precisely known and stable geographical positions, forming a grid of navigational position lines or "electronic highways."

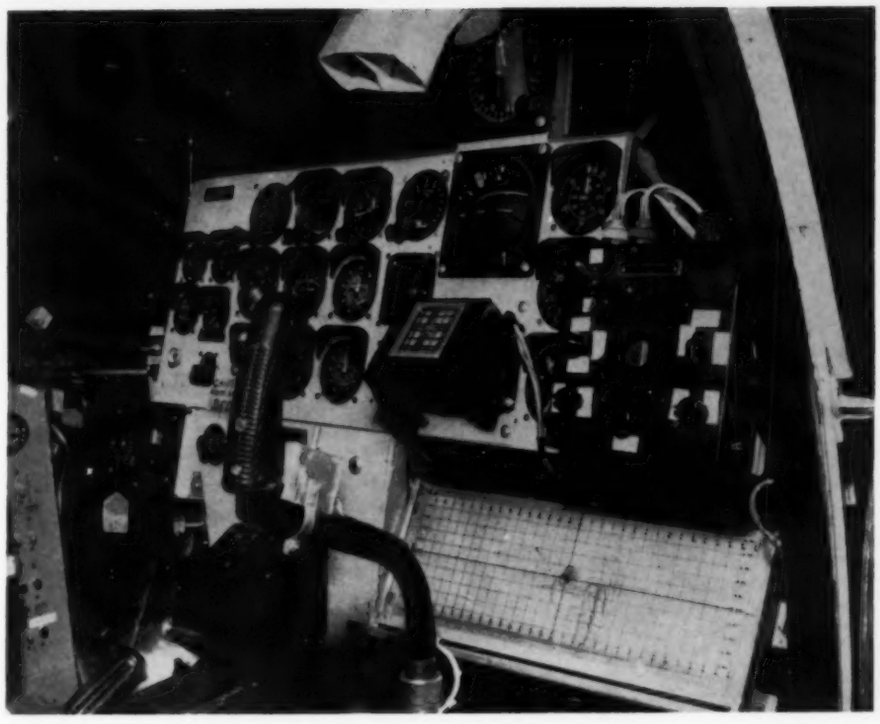
Position lines (technically described as phase relationship between these three various wave fronts) are detected by equipment in the helicopter and the position information is computed and displayed by meters or by a Decca plotting board. A plotting board consists of a stationary navigation chart, which is a map of the area, and a moving ink pen, which tracks the helicopter's position at all times.

The pilot flies the pen to follow the navigation-position lines displayed on the board, deviating from one line or direction as necessary.

Second major equipment item in the Bell-Bendix achievement is a Bendix sonic altimeter of incredible accuracy. It measures absolute altitude from 0 to 300 feet. Where conventional barometric altimeters are accurate to

Sonic altimeter device is shown on nose of the Bell 47H-1. Complete Bell-Bendix-Decca airborne equipment weighs less than 80 lbs. —(Bell Photo.)





Completely instrumented Bell 47 cockpit is shown at right. Instrumentation by number (see sketch) is: 1. Decca plotting board, 2. Kenyon transitometer control box, 3. tachometer, 4. manifold pressure, 5. air speed, 6. ground speed, 7. attitude, 8. heading, 9. rate of climb, 10. cross-pointer, 11. absolute altimeter, 12, 13, decometers, 14. altimeter, 15. oil temp., 16. cylinder head temp., 17. ground speed, 18. transmitter selector, 19. tachometer, 20. compass system indicator, 21. load meter, 22. oil pressure, 23. carburetor air temp., 24. ignition switch, 25. fuel, 26. Decca control box, 27. coordinate control box.

—(Bell Photo.)

within 50 feet or so, the Bendix sonic altimeter is accurate to within only 3 *inches.*

A cross-pointer indicator on the instrument panel uses information from the navigation radio receiver for its vertical bar. The pilot keeps it centered to maintain his desired track. Information from the sonic altimeter is fed into the horizontal bar for its use as a glideslope indicator. Thus the pilot is furnished localizer and glideslope indications for instrument letdown. The cross-pointer indicator also has a third function designed into it. A needle is incorporated to give heading information. This is in addition to a large and separately-mounted heading indicator.

Third major equipment installation in the cockpit is a Kenyon "transitometer," a square-faced instrument containing a number of movable vertical and horizontal grid lines on which a stationary aircraft silhouette is superimposed. This is actually a special hovering indicator and is in addition to a separately-mounted, large-size attitude indicator. The conventional attitude indicator does not provide sufficient information to enable a pilot to hover with accuracy under instrument conditions, for a helicopter in perfect level trim in relation to the horizon is still subject to air movement when hovering. This movement or drift can be in a horizontal plane or up and down. But the Kenyon transitometer's moving grid pattern furnishes a complete indication of drift, enabling the pilot to correct for all motion while hovering on instruments.

In the Bell-Bendix experimental installation, the transitometer utilizes information from a classified Navy Doppler radar, which is a ground-speed computer and thereby detects aircraft movement over the terrain such as drift. However, Bell and Bendix engineers used this radar only for the sake of convenience in expediting their program. The transitometer could be wired into the Bendix-Decca navigation system and sonic altimeter for the same information without imposing on the installation the complications of a separate Doppler radar installation.

The Bell-Bendix experimental installation, even including the radar, adds less than 80 lbs. to the helicopter's empty weight. The two helicopters carrying this installation are equipped with 50-amp generators, but could use 75-amp generators more effectively.

In a typical flight demonstration, the pilot pinpoints an "x" destination on his Decca plotting board map of the area before take-off. This can be a remote landing spot anywhere within a radius of 100 miles covered by the Bell-Bendix Decca transmitter chain — for example, it can be a clearing in a clump of trees, or any other unprepared landing spot. From take-off, he flies the pen on the board, which traces his flight path on the map continuously. Drift from cross-winds shows up instantly as the pen moves off the selected track. Position with respect to the desired track is also shown by the localizer needle on the cross-pointer.

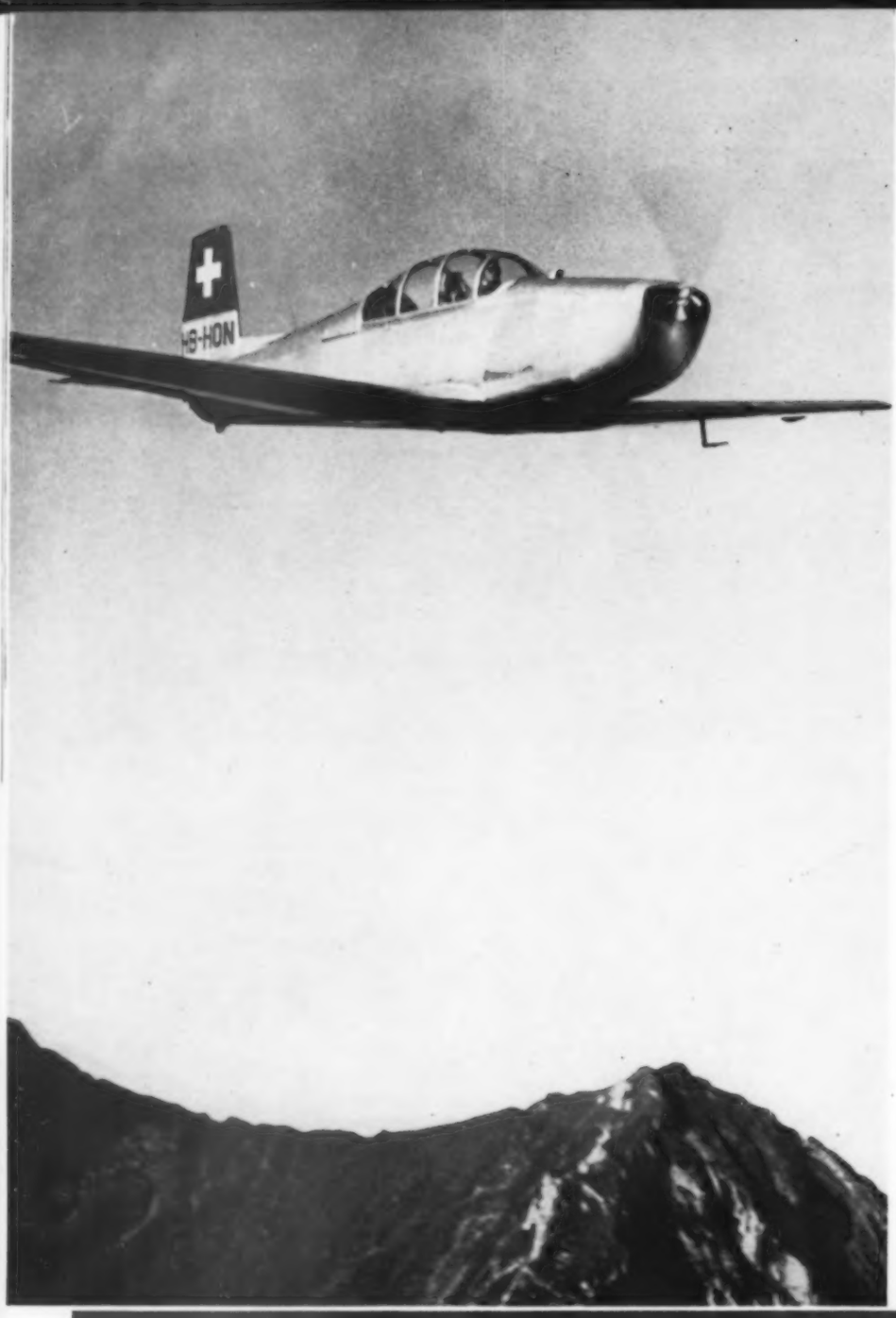
In selecting his precise landing spot at destination, the pilot dials its grid position in to a coordinate converter of the Bendix-Decca system. Position of the helicopter relative to this point is presented on the cross-pointer.

Information from the sonic altimeter is switched into the glideslope needle of the cross-pointer. It is brought to center position by letting down for the landing, this providing the equivalent of a remote area instrument landing system. When vertical and horizontal indicators are centered, the helicopter is directly over the preselected spot.

For the actual landing, the pilot makes a second transition, this time to the sonic altimeter and the Kenyon transitometer, or hovering indicator. By correcting for any vertical or horizontal movements of its grid lines, the pilot eliminates drift and eases the helicopter onto the ground in his landing.

Completely "black bubble" blind landings are provided for in the research project, but engineers point out that 100 per cent instrument landings are seldom necessary in a helicopter, regardless of weather minimums. Forward speeds can be reduced

(Continued on page 44)



New Swiss Trainer

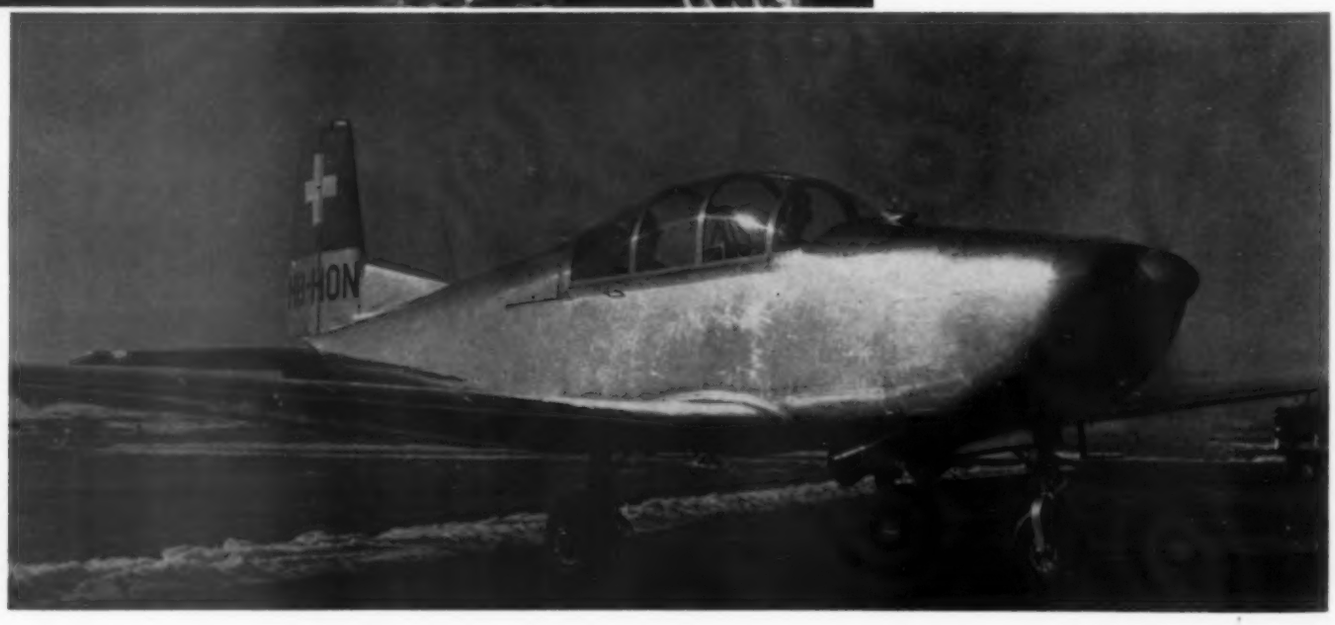
THE new standard trainer for the Swiss Air Force is the Pilatus P-3 tandem two-seater, developed by Pilatus Airworks, Ltd., at Stans, Switzerland. Looking very much like the American Navion, it will replace the Bucker Jungmann primary trainer and the P-2 advanced trainer. No other type of aircraft will be necessary to train a student before flying the de Havilland Vampire jet trainer, which is now standard in the Swiss Air Force.

Powered by a 260-hp. Lycoming GO-435-C2 engine with 3-blade constant-speed Hartzell propeller, the P-3 has a top speed of 190 mph. and cruises on 60 per cent power at 157 mph. It can be fitted with a machine gun, 2-inch Oerlikon rockets, two small bombs and a combat camera for gunnery training.

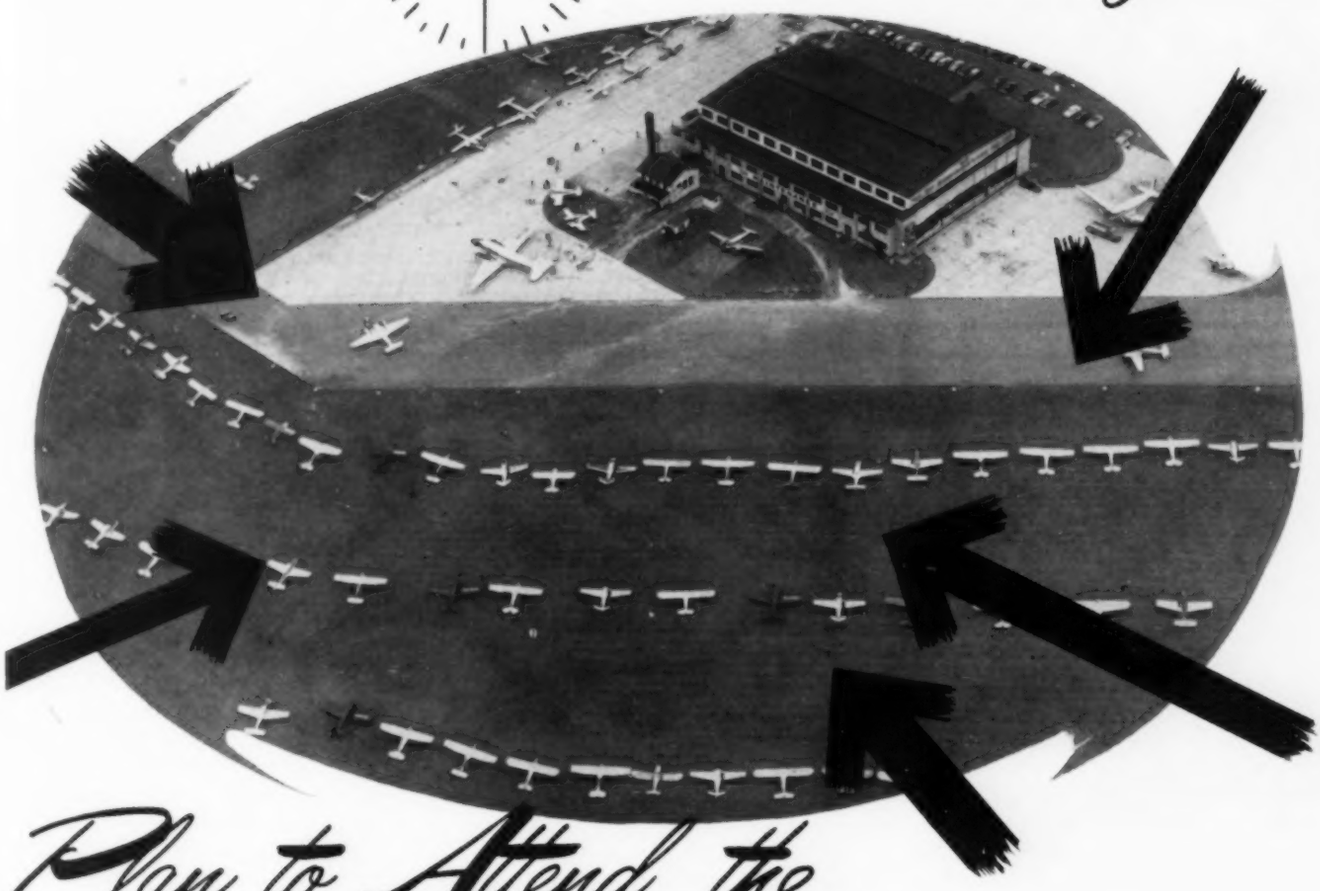
Gross weight is 3,310 lbs., at which it is licensed for aerobatics; empty weight is 2,276 lbs.; useful load is 1,034 lbs.; span 34 ft. 2 ins.; length 28 ft. 9 ins., and height 10 ft.

The prototype was first flown in 1953 at Stans near Lucerne. An order for a pre-production batch was followed by a first production order of 18 and a second order for 42 P-3's was placed in March, 1957.

Switzerland's Pilatus P-3 has a maximum placard speed of 310 mph. (dive), top speed of 190 mph., cruising speed of 157 mph. using 60 per cent horsepower.



TAKE A HEADING FOR *Reading*



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TWIN TURBINES REPLACE SINGLE PISTON ENGINE in this experimental Sikorsky HSS. The turbines are General Electric T-58's, developed for the Navy, and each is normally rated at about 1,000 *hp. They replace a single Wright* R-1820 *piston engine.* —(Sikorsky Photos.)

BELL-BENDIX SYSTEM

(Continued from page 41)

to zero at will, and it is nearly always possible to break out of solid instrument conditions within 100-200 feet of the ground. However, black-bubble operations would become necessary in remote operations such as military infiltration of enemy territory where lights or other devices could not be used at night.

In ordinary operations, obstacles near selected landing sites would be marked on the navigation charts, for avoidance. With the Bendix-Decca plotting board pen tracing the flight track, it becomes a simple matter to avoid known obstacles.

Bell pilots have made scores of instrument flight experiments during the past year in perfecting the system. They report repeated success with incredible accuracy. Position accuracy has been within plus or minus 20 feet and absolute altitude accuracy for landing approach has been within 6 inches at levels up to 150 feet off the ground and within only 3 inches below a level of 10 feet off the ground.

"This is a major breakthrough in perfecting the state of the helicopter art," commented Jay Overholser of Bendix-Pacific. "It means completely push-button navigation, for example. Anywhere within the Bendix-Decca navigation chain, a pilot can set up a dependable ILS landing spot all his own, without any ground equipment at that spot."

The Bell-Bendix navigation project, when coupled with another long-range Bell instrument flight study already under way, will bring still more remarkable accomplishments with the helicopter. This second program is known as "Imhep" — ideal-man-helicopter-engineering-project. It involves revolutionary developments, such as making the helicopter more stable through the use of assisting devices, discarding old instruments and starting over with new instrument displays designed for the purpose, and providing the pilot easy-to-interpret flight information. Its major objective is to "fly helicopters anywhere, anytime, under all conditions of visibility *with pilots who have no special instrument training.*"

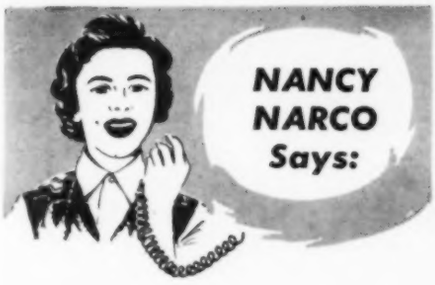
A Bell engineer, commenting on this project, makes the following statement: "The helicopter will not be bristling with antenna and it will not be weighted down with black boxes. The interior of the cockpit will certainly look new, and it will be here that the pilot senses a revolution. We expect this pilot (standard Grade A helicopter man with no particular instrument qualifications) to be able to take this new helicopter anywhere, anytime, under any condition of visibility."

The Bell-Bendix-Decca remote area ILS breakthrough, when viewed in light of the long-range Imhep project, becomes a remarkable accomplishment in helicopter utilization development.

For commercial operations, it has many applications. Most of the world's leading helicopter operations are located in relatively remote areas — offshore oil drilling in the Gulf of Mexico and uranium prospecting in isolated desert-mountain-lake areas of the United States and northern Canada, for example. Helicopter airlines in Los Angeles, Chicago, New York and Europe do not serve isolated areas but need precision instrument flying capabilities for round-the-clock metropolitan air service between heliports.

There would be many important Bendix-Decca benefits to fixed-wing aircraft utilization and its operation would prove significant in solving the mounting air traffic puzzle, for it would allow dispersion of aircraft operations to outlying airport areas without the need for extensive ground radio installations at each airport.

Being the latest air traffic development, even though it is presently confined to helicopter operations, the Bell-Bendix project is subject to being handicapped by earlier programs designed for fixed-wing traffic handling. These include Tacan and other systems. The case for the separate helicopter system, however, is based on the fact that high-frequency radio navigation is virtually useless for low-flying helicopters. The low-frequency Bendix-Decca system is not restricted to line of sight and is actually useful to ground vehicles and ships with equal accuracy and facility. A single Bendix-Decca chain covers an area of 100,000 square miles and everywhere in that area, down to the ground level, the continuous position-fixing service is available without interruption.



Hello again,

HAVE YOU EVER been tooling along on a nice day with nothing to do but watch the check points go by—a little bored by it all? Well, if you want some entertainment, don't turn on the commercial broadcast music. Just flip your VHF receiver around the dial a couple of times until you latch on to a Center frequency, then listen to an Aircraft Control Center working the lads on IFR flight plan.

IT'S MORE FUN than reading other people's mail, and you get a lot out of it. You hear both sides of the conversation . . . there's an occasional foul-up on position reports ("ATC wants an explanation for your last estimate . . .") . . . and you can pick up heaps of good information. Sharpens up your own radio usage, and lets you realize those controllers aren't ogres but just nice guys doing their best to handle a difficult job—and with what patience!

A VISIT TO THE TOWER is very interesting, and educational, too. Next time you have some spare minutes, give the tower a call. Tell them you're a pilot and would like to look over their shoulders for a while. (Don't bother to bring all your aunts and nephews with you.) You'll learn a lot watching the Controllers at work and when you understand their end of this traffic control business it will help you immensely next time you're calling in for landing clearance. I've checked with CAA and they encourage tower visits by pilots—but please don't bother the boys when the weather's down and there's heavy IFR traffic. They're a little too busy to serve tea to visitors under those conditions.

LAD FROM DES MOINES wrote in suggesting a little more courtesy on the part of us radio users. Said he was getting fed up with inconsiderate guys who tie up the range frequency just before a scheduled weather broadcast by filing a flight plan or asking for winds aloft all the way from Chicago to Seattle. Guess lots of us have been frustrated, too, when the ceiling's getting down and we're waiting for the latest weather only to have someone butting in at scheduled broadcast time. Unless it's really urgent, why don't we all lay off the mike for a few minutes before the weather broadcasts at 15 and 45 minutes after the hour, and let them get their broadcasts off on time? Some poor guy without a transmitter may be down there urgently waiting for the latest weather at Podunk.

See y'all next month,

Nancy

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Designed to fit any standard instrument cut-out, the VOA-3 provides four-in-one presentation—"left-right", "to-from", selected course and reciprocal bearing. The VOA-3 is built to highest standards for dependable IFR use and has factory-certified accuracy of plus or minus 2 degrees.

The VOA-3 was made to order for aircraft already equipped with a basic omninavigation system and the 1016 or Simplexer for communications. By adding the compact, lightweight VOA-3 you gain the advantage of a second, highly accurate VOR/ILS Localizer system for added ease and safety in cross-country navigation.

TOTAL WEIGHT—FOUR POUNDS

VOA-3 indicator fits any standard 3⅛" instrument hole, is only 1¾" deep. Shock-mounted converter can be remotely installed, weighs 3.3 pounds. System is easily added to existing Sapphire 1016 or Simplexer units which have provisions for this installation.

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Tilting-Wing Vertol Ready For Testing

THE first tilt-wing vertical take-off and landing (VTOL) aircraft ever to be readied for flight-testing has begun ground tests — well ahead of schedule. It is the small, 2-place Vertol 76, designed and built by Vertol Aircraft Corporation at Morton, Pennsylvania, for the U. S. Army in cooperation with the Office of Naval Research.

It is powered by a Lycoming T-53 turbine, shafted to drive wing-mounted counter-revolving rotor-propellers. Two ducted fans in the tail section, one vertical and one horizontal, will control yaw and pitch during hovering and slow flight.

No details have been released, but the Lycoming turbine, normally rated at just under 1,000 hp., will provide more pounds of thrust than the aircraft weight in pounds, this being necessary for vertical take-off and landing characteristics.

The wing and its propellers will tilt as a unit through a 90-degree arc, being vertical for VTOL and hovering and horizontal for forward flight, during which conventional airplane controls are effective. The tilt-wing can also be operated at positions in between horizontal and vertical, so that the Vertol 76 will have short take-off or landing (STOL) characteristics as well. This would give it performance capabilities in overloaded conditions.

Vertol 76 has tubular structure behind cockpit resembling 3-place Bell helicopter cabin. Lycoming T-53 turbine of about 900 hp. drives rotor-props and small ducted fans in tail. Yaw and pitch control in slow flight and hovering is furnished by ducted fans.

(Vertol Photos and Sketch.)

HERE'S WHY THE PIPER TRI-PACER IS THE FAVORITE LOW-COST BUSINESS PLANE

NEW CABIN COMFORT AND CONVENIENCE
Beautiful is the one word to describe the 1957 Tri-Pacer's interior. Tough, long-lasting vinyl in Rose, Red or Blue combines with silver tufted nylon upholstery material and piping. Note adjustable front seats, convenient arm rest, individual window ventilators. Dual high capacity heaters keep cabin snugly warm in winter.

In 1957 more Piper Tri-Pacers, by far, have been delivered than any other comparable low-cost, four-place business airplane. Little wonder. The Tri-Pacer has more performance, more power, and more features to simplify flying than any other four-place plane on the market—tricycle landing gear...simplified, inter-connected controls...famed inherent Piper stability. Yet the Tri-Pacer is priced far less.

Make 1957 your year to fly your own 130 mph Tri-Pacer for time and money-saving business travel, more frequent and interesting pleasure trips. See and fly the new 1957 Tri-Pacer. Compare price, performance and all-around features. The Tri-Pacer will be your choice as it has been for more than 5,000 other purchasers. See your Piper dealer or write for full-color Tri-Pacer brochure, **Dept. F-5, Piper Aircraft Corporation, Lock Haven, Pennsylvania.**

EXCLUSIVE REAR DOOR provides easiest access to rear seat, permits loading large, bulky items when rear seat is removed (in 15 seconds) for freight.

OUTSIDE BAGGAGE DOOR is another Tri-Pacer feature exclusive in its class. Lots of room for baggage, too.

NEW "RUNNING BOARD" adds to ease of entering and leaving front seat.

IDEAL INSTRUMENT PANEL
With IFR operations increasing for maximum utilization, the 1957 Tri-Pacer has the ideal instrument panel. Here's standard layout for Super Custom...full gyro panel on left in front of pilot, radios in center, engine instruments on right. Fully equipped Super Custom Tri-Pacer compares in price with other aircraft with no equipment.

MORE PEOPLE HAVE BOUGHT PIPERS THAN ANY OTHER PLANE IN THE WORLD

FAIRCHILD TURBO-PROP mock-up and specification details were discussed recently by 39 top pilots and corporate officials who have ordered or are evaluating the new Fairchild F-27, pictured above and at left in two new views. J. F. (Skeets) Coleman, Fairchild customer relations man and well-known test pilot, was in charge. He and R. James Pfeiffer, Fairchild director of customer relations, said standardization details agreed on included an airline-type door, fuel systems, electronic equipment, cockpit instrumentation and cabin interior designs. "Many of those attending represent the cream of the most experienced business plane pilots — they know what they want," Coleman commented. The meeting is pictured below. At left in the F-27 mock-up are: Ray Swider (left), chief pilot, and John Fletcher (right), co-pilot, for General Tire with Coleman. General Tire was the first corporation to order an F-27.

NATIONWIDE ROUNDUP:

New Business In the Hangar

CONFUSION AMONG AIRCRAFT OWNERS over the elimination of the annual aircraft inspection by the new Civil Air Regulations has led the CAA to issue a notice which seeks to clarify the situation. This notice, from the Office of Flight Operations and Airworthiness, follows in full:

"The new Civil Air Regulations eliminated the annual inspection and reissuance of an airworthiness certificate by the CAA Administrator or his designated representative. In the place of this annual inspection, A PROGRESSIVE INSPECTION OR A PERIODIC INSPECTION EVERY TWELVE CALENDAR MONTHS IS NOW REQUIRED.

"This may be accomplished by the holder of an inspection authorization, a certificated repair station or the manufacturer. Prior to having this inspection conducted, you must have a new airworthiness certificate which may be obtained from your local CAA inspector in exchange for the old one provided it has not expired. If the old certificate expires, you must have your aircraft inspected by a CAA inspector, and due to workload it may be difficult to secure a prompt appointment. You are therefore urged to exchange your airworthiness certificate for the permanent type if you have not already done so. No inspection is

FOLDING SERVICE TRAY which fits into back rest of aircraft seat is available in kit form from Hardman Tool & Engineering Co., Los Angeles, for installation on existing Hardman seats and is incorporated in the new Convair 340-440 passenger chair series. When extended, it provides a fixed, steady surface with no obstructions to interfere with passenger.

FIRST COMMERCIAL JET OVERHAUL CONTRACT has been obtained by Pacific Airmotive at Burbank from Continental Air Lines. The PAC jet shop (right) has already serviced or modified more than 200 J-57 jets in this shop.
—(Pacific Airmotive Photo.)

required, and the exchange can be handled by mail to any CAA General Safety District Office. Following exchange, the next periodic inspection will be due twelve calendar months following the date of issuance of the OLD certificate. This date will be found in your aircraft logs if your records have been maintained properly. You should have your logbooks readily available for presentation upon request to any authorized representative of the Administrator or the Civil Aeronautics Board, as this will be the only evidence that you have complied with the inspection requirements to keep your airworthiness certificate valid."

PACIFIC AIRMOTIVE at Burbank has obtained the first commercial jet engine overhaul contract in the aviation industry — to overhaul Pratt & Whitney J-57 engines powering a fleet of four Boeing 707 airliners ordered by Continental Air Lines for 1959 delivery. They will operate between Chicago, Kansas City, Denver and Los Angeles by August, 1959.

John W. Myers, PAC president, said his firm has reworked and modified over 200 J-57's since 1953 and plans to erect this year jet test stand facilities for both the J-57 and the more-powerful J-75. He said his is the only private maintenance facility already equipped to overhaul J-57 accessories and equipment will be added for accessories of the J-75, which will power later versions of the 707 and Douglas DC-8 airliners.

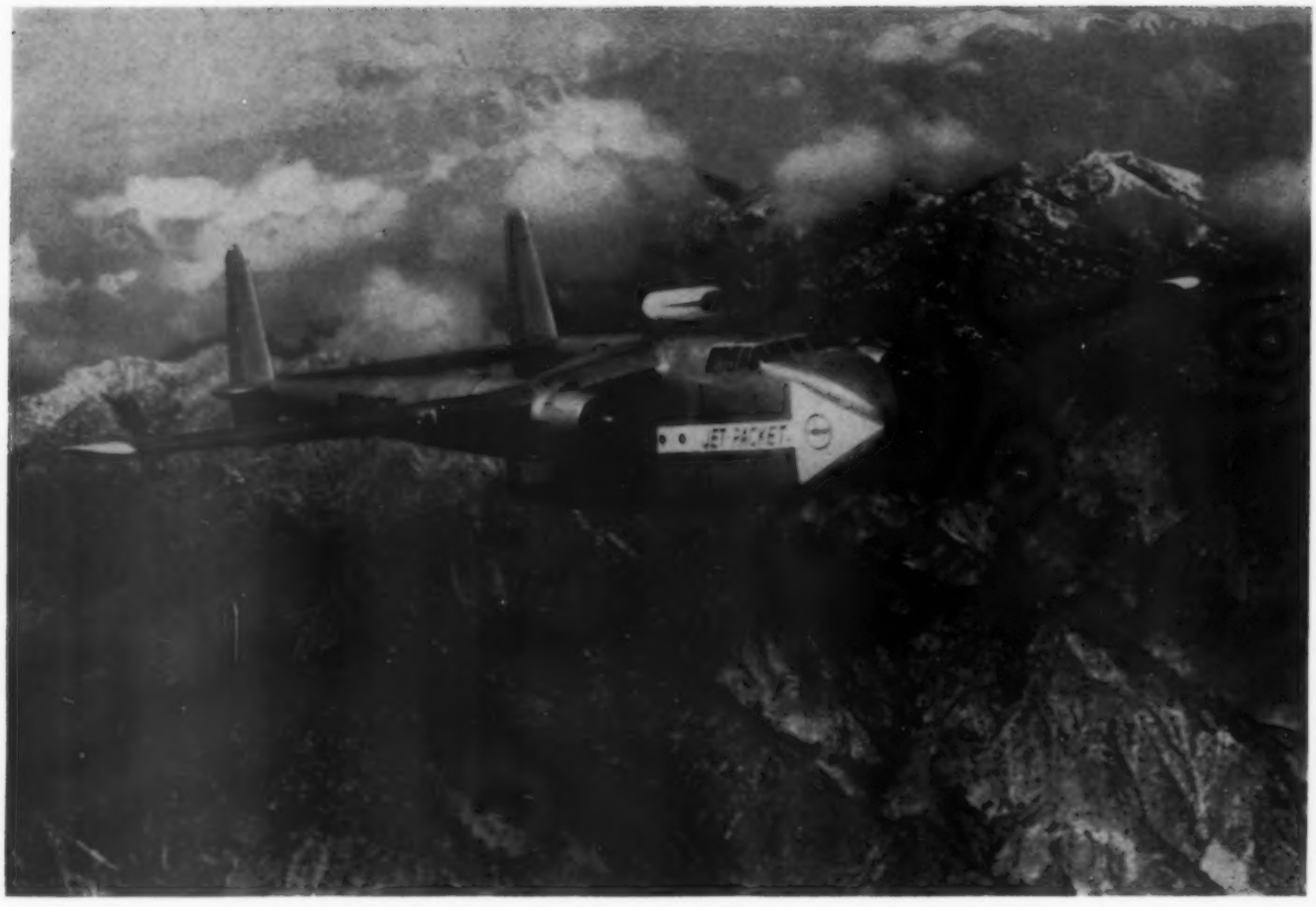
Robert F. Six, Continental president, said his airline originally planned to establish its own jet overhaul facilities at its new $2.5 million Los Angeles maintenance and overhaul base, but that a "realistic evaluation of the necessary cash outlay to equip a jet overhaul facility and the time required to train personnel to handle the J-57 had made it evident that substantial savings in operations would result from utilizing PAC's facilities and technicians." The new Continental base will now be used exclusively for aircraft overhaul and maintenance of the airline's new fleets of 5 DC-7B's, 15 Viscount propjets and 4 Boeing 707's.

SOUTHWEST AIRMOTIVE-OVERHAULED WASP JUNIOR ENGINES are now available through 12 fixed-base operators in nine states on an engine exchange dealership plan inaugurated last month. Participating dealers include Aircraftco at Wichita, Aircraftsmen at Oklahoma City, Alamo Aviation at San Antonio, Butler Aviation at Chicago, Cutter-Carr Flying Service at Albuquerque, Engle Flying Service at Bristol, Pa., Northern Air Service at Grand Rapids, Page Airways at Rochester, N. Y., Pan-Air Corp. at New Orleans, Topeka Aircraft at Topeka, Tulsair at Tulsa and Skymotive at Chicago.

On request by a dealer, Southwest Airmotive at Dallas will test run a newly-overhauled engine and ship it within three days according to the purchaser's instructions. The dealer returns to SAC an operative trade-in engine with serviceable crankshaft, using the shipping container sent him with the exchange engine. Only engines removed from a Twin Beech for normal overhaul will be accepted. Southwest claims to have overhauled more Wasp Juniors than any shop in the world, having reworked and completely prepared thousands of R-985's used on Twin Beechcrafts. It is an authorized Pratt & Whitney distributor and overhaul shop.

Exchange R-985-14B's, complete with overhauled carburetors, magnetos and ignition harness and with polished push-rod covers, conform to all latest bulletins, with crankshafts drilled for hydramatic propeller or plugged for use with constant-speed propeller, as desired. Southwest uses new P & W parts in its overhauls and issues a full warranty covering 90 days or 100 hours of operation. The recommended dealer R-985 exchange price to the customer is $2,350, which is the same as the SAC price at Dallas.

NEW McMILLAN RADOMES FOR DOUGLAS DC-3 INSTALLATION, with one version for X-band and another version for C-band radar, are now being installed by Reading Aviation Service at Reading, Pa., which also manufactures mounting bracketry and dome attachment hardware. Antenna is mounted on a hinged bulkhead at Station 20 and the dome is hinged at the top for raising 90 degrees. Mounting bracketry will accommodate Bendix, Collins or RCA radar equipment and pre-formed absorption material is furnished with the bracket. McMillan Industrial Corp., Ipswich, Mass., is one of the oldest radome fabricators in the country. —(Reading Aviation Photos.)



Saved by Jet Kit

Two small "J-1600 Turbassist" engines called a "Jet-Pak 3200" installed atop the cabin of a surplus C-82 Packet have given it one-engine-out performance said to be "safer than that of several respected airliners," according to Steward-Davis, Inc., Gardena, Calif. With the jet auxiliary, the conversion is shown in the photos cruising with one prop engine feathered. Thrust of the Jet-Pak was not given. With Jet-Pak power added, cruising indicated air speed is 175 mph., compared to 140 mph. IAS with the two R-2800 piston engines at 2,000 rpm. and 25 ins. manifold pressure. These figures are for a 47,000-lb. gross at 11,000 ft. At this gross, the C-82 with Jet-Pak assist reached 10,000 ft. only 5.5 mins. after the brakes were released for take-off from Palm Springs, Calif. At 5,400 ft., single-engine climb with Jet-Pak assist averaged 535 fpm. up to 9,400 ft. Lester Coan, Douglas test pilot, and Clyde Pangborn were test pilots for the conversion, which will be licensed in Mexico. Drag of the auxiliary power unit's frontal area is said to cost only 3 mph. in cruising air speed penalty when the unit is inoperative. Its use is primarily for operation during take-off and climb over obstacles.

Corporate aircraft in the Southwest Airmotive shops last month included La Consolidada's B-50 Twin-Bonanza from Mexico City, piloted by Capt. Luis Salinas, in for a double engine change; the Codell Construction Co. Aero Commander from Winchester, Ky., flown by E. F. Kinnaird, inspection and engine overhaul; Hyde Construction Co. Beech 18 from Jackson, Miss., Howard Wright, pilot, double engine change; and Shamrock Oil and Gas Twin Beech from Amarillo, Tom Smith, pilot, inspection.

AIRESEARCH AVIATION SERVICE division of the Garrett Corp. at Los Angeles International Airport has received Texas Eastern Transmission's DC-3 for major overhaul. The plane was brought in by Chief Pilot Jim Ketner and John Hardy. It will also undergo exterior painting, installation of a complete executive interior with picture windows, AiResearch Maximizer kit, Janitrol heater, RCA radar, and 1830-94 engine installation. . . . Earl Hartman, chief pilot for Goodyear of California, reports a substantial increase in speed and reduced engine maintenance since AiResearch installed its speed modernization kit in Goodyear Tire and Rubber's Beechcraft D18S. It has flown over 300 hours since the modification. Engineering for this same installation has been purchased by Richfield Oil and Ohio Aviation. . . . Sawhill Tubular Products' DC-3 received a 100-hr. check on the aircraft and engines,

The '57 Beechcraft Twin-Bonanza offers more payload, carries more cargo, has greater range, gives better performance, has more visibility, more passenger comfort, is more quiet, has more safety features, a better safety record, comes more completely equipped, has higher resale value than any other airplane in its class!

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CUSTOM INSTRUMENT AND RADIO PANELS in an Aero Commander 680 of Aero Southern, Nashville, have been installed by Reading Aviation Service. The installation includes ARC ADF-21, ARC 15-D omni with IN-14 indicator, CD-1 course director, 360-channel Narco 1016 Sapphire transceiver, Narco Mark 2 Omnigator, Lear L-2 autopilot, Allied Instrument slaved gyro, ARC R89M glideslope, ARC R-20 marker beacon, ARC F-13 audio amplifier and SunAir HF transceiver.

AiResearch Maximizer exhaust system and other work. Pilots are L. J. Smith and Bill Dennison. . . . An executive interior, auxiliary power unit and Sperry engine analyzer were installed in Ford Motor's new Convair 440, which was accompanied to AiResearch by B. J. Bergesen, manager of air transportation, and Chief Pilot Bob Hixon. . . . The North American Life and Casualty DC-3 was at AiResearch for partial refurbishing of the cabin interior and the cockpit. Pilots are Chuck Wilson and Russ Stoddard. . . . The Green Hornet, Garrett Corp.'s own DC-3, is in the shops for major overhaul, complete rewiring, cockpit modernization and an 1830-94 engine installation. . . . A 100-hr. inspection and minor items were completed for McCulloch Motors' Beechcraft Super 18, flown by Jim Dyerly. . . . A North American Aviation DC-3 is undergoing a center-section attach angle modification, having all control surfaces recovered and exterior painting. . . . CAA at Oklahoma City has purchased the AiResearch geared rudder boost-tab for its DC-3.

HOWARD AERO of San Antonio has sold its 21st Super Ventura to United Transports, Inc., Oklahoma City. . . . Kudner Agency, national advertising agency of New York, has accepted delivery of the latest 300-mph., 2,000-mile-range Super Ventura. Included in its equipment were dual Bendix navigation and communications installation, Bendix radar, Sperry autopilot and Aero-Jet thrust augmentors.

AIRCRAFT ENGINEERING AND MAINTENANCE COMPANY at Oakland, subsidiary of Transocean Corp., will have one of the world's largest aircraft maintenance hangars when the structure is completed by the Port of Oakland at Oakland International Airport. It will have the largest free cantilever span in the U.S., 160 feet without intermediate supporting columns, according to the company. The entire structure will measure 600 ft. by 225 ft., with 135,000 sq. ft. of roof area. The new facility is for expansion of the firm's military and commercial aircraft overhaul activities.

DALLAS AERO SERVICE is installing its Lodestar performance improvement modifications to Lodestars of El Paso Natural Gas, Swede Johnson, chief pilot, and Suntide Refining of Corpus Christi, Bobby Barnard, chief pilot. . . . DAS has contracted to perform power plant modifications to 15 more Super 680 Aero Commanders, bringing to 32 the total number of Commanders on which it has performed this work. . . . Other new jobs in the DAS shops include: 100-hr. inspection and relicensing of the Jay Cobb's Penrod Drilling Dove of Dallas; 100-hr. check and engine change for Jack Tarver's Olin Mathieson Beech 18 from Monroe; double engine change and short stacks for the Rugene Transport DC-3 of Dallas, flown by Kermit Wood and Art Thomas; 100-hr. check for the Ray Smith Transport Lodestar of Dallas, Al Phillips, chief pilot, and Rolls-Royce Merlin engine change and additional cockpit installation of special electronic and instrumentation in Jim Cook's research F-51, which Cook operates under contract for the U. S. Weather Bureau Tornado Research program. Cook's recent thunderbuster flying has been centered in Texas storm areas. . . . Dallas Aero Service is overhauling R-1830 engines for four airlines — Braniff, Southern, Trans-Texas and Central.

REMMERT-WERNER at St. Louis has delivered a new Super-92 DC-3 to Trans Canada Pipeline, Ltd., Toronto, Tom Griffith, pilot. It has special custom interior, custom radio and instrument panel, Edison fire detectors, Collins, Bendix and ARC radio. . . . Other recent Remmert-Werner jobs include: Engine change for Green Bros. Construction B-50 Twin-Bonanza; landing gear doors, double engine change and geared rudder tab for the Spartan Air Services DC-3 from Ottawa, Ontario, D. C. Olson, maintenance manager; Super-92 engines for Ted Lawrence's Canada

Prizes, Forum Topics Listed for Business Flying Clinic at Reading Aviation on June 1

READING AVIATION SERVICE'S 8th annual maintenance and operations meeting to be held on June 1 at Reading, Pennsylvania, featuring more than $2,100 in cash prizes and 16 trophies in competitions for the best appearing and best-equipped business airplanes, will have a full program of timely and interesting Forum discussions, devoted to the interests of business pilots and conducted by the Flight Safety Foundation.

Keynote speaker will be Jerome Lederer, executive director of Flight Safety Foundation. Topics and discussion leaders will include: Design Pitfalls, by Bob Buck, airline captain; Single-engine Emergency Problems, by Dr. Leonard Greene, instrument developer; Training Standards, by Randy Carpenter, Flight Safety Foundation; Bogus Parts, by Joseph Chase, Flight Safety Foundation; Air Traffic Control, by John Wilson of the New York Center and Art Graham of the LaGuardia tower.

Sime Bertolet, Reading Aviation Service president, said there will be four judging classifications in the competition for best appearing and best-equipped business planes — single-engine, twin-engine under 5,000 lbs. gross, twin-engine 5,000-12,000 lbs., and multi-engine over 12,000 lbs. In each there will be judging for best exterior, best interior and best equipment and instrument presentation, with a fourth prize in each category for the best of class. Smallest cash award will be $100 and largest $300, the latter for best of class in the medium twin class. Each winner will receive a trophy. This year a new award has also been established for the oldest, best restored and flyable airplane, for which a $300 cash prize will be awarded. Last year, more than 150 business planes attended the event despite unfavorable weather. In 1955, nearly 400 business planes attended. More than that number is expected this year for the one-day event, open to all business planes. George Haddaway will be master of ceremonies.

Packers' Lodestar; engine change for Ralph Piper's Monsanto Chemical DC-3 of St. Louis; and double engine change for Warren Larson's Riss & Co. Super DC-3. . . . At Remmert-Werner's shop on the Toledo Express Airport were the Libbey-Owens-Ford DC-3, Tracy Service, chief pilot, for installation of Bendix RDR-1 radar, Sperry H-6 horizon and Collins 51V-2 receiver, and the Owens-Illinois Glass DC-3, Dick Riggs, pilot, for a new interior.

AERO CORP. OF ATLANTA reports a new DC-3 conversion with wheel well doors, Dash 94 engines, custom interior, paint job, Bendix X-band radar, flush loops and miscellaneous electronics. Other recent Aero Corp. jobs include engine change and X-ray inspection for F. William Carr's Dove from Corpus Christi; X-ray inspections for the Sid Richardson DC-3 from Ft. Worth, Ed Armstrong, chief pilot; the Tennessee Coal and Iron Learstar from Birmingham, and the Coca Cola DC-3 from Atlanta. . . . Aero Corp. is re-skinning the top of the wing on the C-54 it is reworking for Argentina.

READING AVIATION SERVICE at Reading, Pa., had two Doves in last month for X-ray inspection of the main spar to comply with an AD note. They belonged to Boyertown Auto Body Works, Boyertown, Pa., and Rish Equipment, Bluefield, West Virginia. The latter's chief pilot, Sam Hyams, also installed a 360 Dare, ARC 15-D omni, R89M glideslope, and ARC F-11 isolation system. Modifications were made to the spar center section and lower spar boom. . . . Sun Oil's DC-3 received a 100-hr. check, also performed for Maryland Airways Riley Twin. . . . Amphibious Charter's Grumman Widgeon, Dick Benson, chief pilot, received an auxiliary fuel tank, wing metalizing, gross weight kit allowing 5,500 lbs. on both land and water, propeller overhaul and Narco Mark 2 Omnigator. . . . A belly camera port installation was made in an Aero Commander of Michael Baker, Jr., Inc., Rochester, Pa. . . . Warren Green, pilot of Empire Steel Castings, Reading, had his 560 Commander equipped with an ARC 15-D omni, ARC F-13A audio amplifier, and Lear 2200 marker beacon receiver. . . . Clemson Brothers, Middletown, N. Y., had their B-50 Twin-Bonanza equipped with an ARC 15-D omni, ARC 21 ADF, Collins 51V-3 glideslope, ARC course indicator, CD-1 course director and new radio control panel. Charles Kerper of RAS is the Clemson pilot.

L. B. SMITH AIRCRAFT at Miami will license its C-46/CW20-T airliner for a 50,000-lb. take-off gross. For the CAA certification program, a new CW20-T is being instrumented. It is expected that the higher gross will be offered to present users of the improved C-46/CW20-T, with few changes required. Twelve are in operation from Alaska to Argentina, seven are undergoing re-manufacture at LBS and several more are on order. Ed Brush, LBS engineering director, is in charge of the new flight test program.

ADDISON AIRPORT, the new executive airport under construction in Dallas with Convair-type runway and 24-hr. operation, has signed contracts with five aviation firms which will construct facilities and occupy the new business flying field. Collins Radio contracted to build a 160 by 160-ft. cantilever hangar under a long-term ground lease with a 10-year renewal and two additional five-year options. Associated Radio signed a 10-year lease at $7,000 a year with options for a 10-year and 5-year renewals, and will construct a 120 by 130-ft. bowstring hangar with an adjoining structure 20 by 100 ft. Dal-Tex Aviation will construct a 100 by 100-ft. bowstring hangar with adjoining structures 20 ft. wide on three sides, signing a 20-year contract at $7,000 annually. Humble Oil has leased four acres of ramp and storage space for five years at $23,208 annually with two 10-year options and will construct a 5,000-sq. ft. terminal-administration building which will be leased back to the airport management. D & S Aviation contracted to build 150 light-twin T-hangars on a 10-year lease at $45,000 annually. The new airport will begin operations in July, according to Henry Stuart, manager.

SKYMOTIVE, INC., at Chicago O'Hare, has retained Design Dynamics, Inc., industrial design firm, to develop and design executive and personal aircraft interiors and coordinate exterior identification.

HORTON & HORTON CUSTOM WORKS at Meacham Field, Fort Worth, last month installed a tone-on-tone blue custom interior in Frank Vine's Duplate of Canada Dove. . . . Dale Olsen, chief pilot, Aurora Gasoline Co., Pontiac, Mich., returned for another interior, this time in his D18 Beech. Modifications included folding cockpit door and certificated aft bulkhead removal and beef-up, frosted walnut buffet and Super Sky Hamper toilet. . . . Tony Zuma, aviation director, Tennessee Gas Transmission, Houston, directed complete interior DC-3 renovations by H & H, featuring a custom ceramic glazed table

Private Aviation Weather Service for Business Pilots

PERSONALIZED weather service for business pilots is becoming available in several aviation centers of the country, the latest being Executive Weather Service, Inc., in Dallas, operated by two Braniff Airways meteorologists, Frank R. Clark and Richard J. Sivert, in a completely-equipped private bureau having all teletype services. For a modest monthly subscription fee, business pilots obtain hourly teletype reports, all available forecasts, 24 and 48-hr. flight planning service, verbal flight briefings and all weather charts. Special services also available include written flight forecasts (map synopsis, map prognosis, weather features, detailed en route forecast detailing cloud bases and tops, freezing level, icing conditions and turbulence, terminal forecasts and winds aloft); graphic cross-section flight forecast with terrain profile; and passenger weather advisory service. This service is especially useful to corporate air fleets and to individual business pilots operating on their own, the savings in time alone being worth the modest cost. Such a service is also valuable for new business fliers interested in acquiring a broader knowledge of aviation meteorology and proficiency in its use. Executive Weather Service, Inc., is located at 137 Walnut Hill Village near Love Field in Dallas.

NEW LOW-COST 27-CHANNEL NARCO VTA-3 VHF TRANSMITTER weighs only 20 ounces, measures 6.25 ins. deep by 6.25 ins. wide by 1-9/16 ins. high. It is available for 118 to 123 mc. or 121.5 to 126.9 mc. bands. Price with two crystals is $132 plus $90 or $150, depending on power supply selected, and can be used with own power supply as a unit or can be attached to the Omnigator, Simplexer or LFR-3, LF receiver.

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Fort Worth, Texas

Champ's Aviation, Inc.
Municipal Airport
El Paso and Lubbock, Texas

Clinton Aviation Company
Stapleton Airfield
Denver, Colorado

Cruse Aviation, Inc.
International Airport
and Clover Field Airport
Houston, Texas

Dal-Tex Aviation, Inc.
Highland Park Airport and Love Field
Dallas, Texas

Dixie Air Associates, Inc.
Municipal Airport
Memphis, Tennessee

Executive Aircraft Company
Municipal Airport
Kansas City, Missouri

Hair Flying Service
Harding Field
Baton Rouge, Louisiana

Howard Aero, Inc.
Service Division
International Airport
San Antonio, Texas

Poelman Aircraft Co.
New Orleans Airport
New Orleans, Louisiana

Ragsdale Flying Service
Municipal Airport
Austin, Texas

Kenneth Starnes Aviation Service
Adams Field; Little Rock, Arkansas

Southwestern Skyways, Inc.
Municipal Airport
Santa Fe, New Mexico
and Ogden, Utah

Sunny South Aircraft Service, Inc.
Broward International Airport
Fort Lauderdale, Florida

Walston Aviation, Inc.
Civic Memorial Airport
East Alton, Illinois

WestAir, Inc.
Municipal Airport
Abilene, Texas

Yingling Aircraft, Inc.
Municipal Airport
Wichita, Kansas

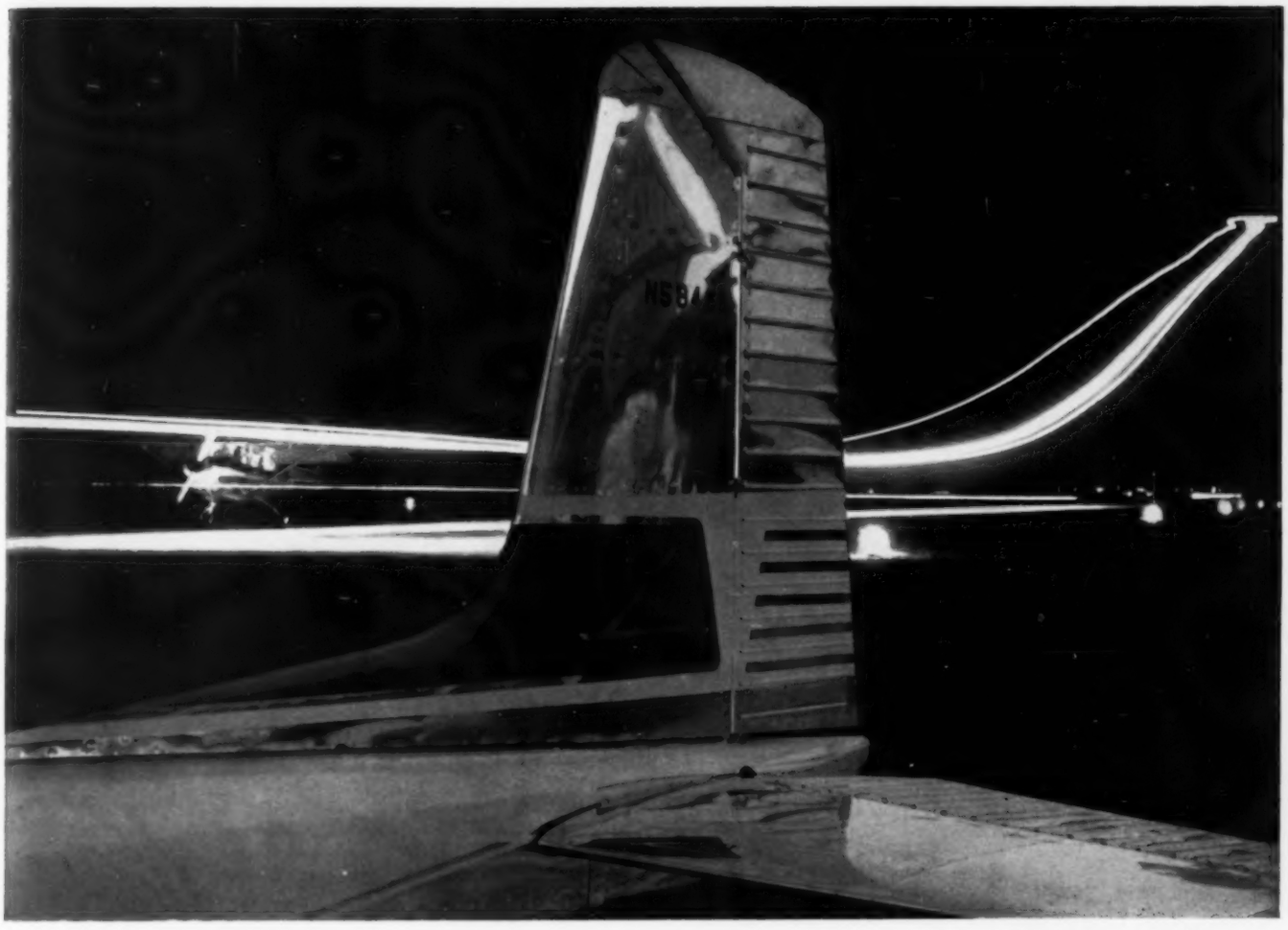
SERVICE SATISFACTION

SMILING SERVICE is what you expect and always receive when our Authorized Cessna Service Stations solve your maintenance needs! We furnish factory skills, factory equipment and factory satisfaction. Cessnas are our specialty . . . and we follow a policy of giving Cessna users a little more, a little better service — LIKE OUR FAMOUS 1-2-3 CESSNA FLAT-RATE SERVICE!

1 You get an accurately quoted price and time-required quotation based on hundreds of job studies covering virtually all maintenance needs.

2 You get genuine Cessna parts and factory-trained workmanship.

3 You save money and time and we stand behind every job for your fullest satisfaction.



Performance with a new *Flair!*

NEW CESSNA 182 COMBINES PERFORMANCE, HIGH-WING STABILITY, LAND-O-MATIC SAFETY—IN AN EXCITING NEW LOW-SLUNG DESIGN!

Stability with a new *Flair!* **Comfort with a new *Flair!*** **Speed with a new *Flair!***

Here's the amazing flight package that cannot be matched by any other single-engine airplane:

Only the Cessna 182 in its class delivers top or near top performance in all ways: short take-off . . . fast high climb . . . long range . . . slow rate of descent—and it costs less than any other plane in its class.

And for 1957, this all-round best airplane wraps it all up with a brilliant new flair in design!

You'll see a new inches-lower silhouette with the look of motion in every line. It makes this great new 182 easier than ever to handle . . . on the taxi strip, down the runway, into the air!

For Cessna's wide-span Land-O-Matic landing gear is now even wider and lower-slung—more stable than ever. Combined with Cessna's high-lift wing and lower center of gravity, it brings you easier, more positive control.

You'll see a new kind of cabin styling . . . a sleek, unhampered look featuring new comfort-recessed front seats, big new high-backed rear seats—plus luxurious new fabrics with textures and colors galore! New, more functional instrumentation. New, automobile-easy parking brake. Even new door closures for quietness.

The dramatic new Flair Flight Cessna 182 is priced (with std. equip.) at $13,975, f.a.f. Wichita. See and fly it now at your Cessna dealer's—Yellow Pages of phone book—or write CESSNA AIRCRAFT CO., Dept. FM-7, Wichita, Kansas.

Cessna

Inquire about Cessna lease plans

4 GREAT CESSNAS 172 180 182 310 THE COMPLETE AIR FLEET FOR EVERY BUSINESS NEED

Monthly Factory Shipments of Lightplanes During 1956

SOURCE: Utility Aircraft Council, Aircraft Industries Association

	JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTALS
AERO DESIGN													
No. Planes	9	7	9	12	12	14	18	18	15	20	12	8	154
Billings (000)	$671	$522	$711	$948	$984	$993	$1,188	$1,186	$975	$1,546	$873	$586	$11,183
BEECH													
No. Planes	51	67	68	75	72	69	60	64	58	48	42	50	724
Billings (000)	$1,808	$2,425	$2,556	$3,043	$3,116	$2,490	$2,589	$2,561	$2,535	$1,814	$1,947	$1,886	$28,770
CALL AIR													
No. Planes	—	2	1	1	3	3	2	2	2	—	3	1	20
Billings (000)	—	$11	$7	$5	$15	$17	$11	$11	$11	—	$18	$6	$112
CESSNA													
No. Planes	248	283	312	306	320	292	258	278	311	218	159	242	3,325
Billings (000)	$2,859	$3,243	$3,612	$3,714	$4,009	$3,464	$3,054	$3,633	$3,279	$2,745	$1,830	$3,118	$38,570
MOONEY													
No. Planes	5	1	10	5	10	8	8	8	9	5	5	5	79
Billings (000)	$50	$11	$79	$30	$94	$79	$69	$82	$93	$53	$51	$50	$741
PIPER													
No. Planes	194	214	192	238	235	195	112	235	166	147	198	168	2,329
Billings (000)	$1,815	$2,092	$1,864	$2,196	$2,265	$2,016	$1,088	$2,599	$1,682	$1,549	$2,096	$2,212	$23,474
TAYLORCRAFT													
No. Planes	2	2	2	3	4	4	4	3	2	2	4	3	35
Billings (000)	$19	$18	$18	$35	$40	$40	$40	$32	$18	$18	$38	$28	$344
TOTALS													
No. Planes	509	576	599	640	666	590[1]	465	608	563	440	413[1]	507	6,738[2]
Billings (000)	$7,222	$8,322	$8,847	$9,971	$10,523	$9,099[1]	$8,049	$10,104	$8,593	$7,725	$6,853[1]	$7,886	$103,791[2]

NOTES: 1. Revised. 2. Includes 162 Champion Model 7EC valued at $597,000 not included in monthly breakdowns. Listings exclude military shipments, helicopters and gliders.

finish resembling crazed marble. . . . Capt. Victor Schrager ferried Compania Frutera de Astral's D18 to Guayaquil, Ecuador, after restyling — off-white and charcoal cleanable vinyls were used throughout; only the vermillion carpet and curtains being fabric. . . . Ralph Cuthbertson, aviation director, J. P. Stevens & Co., Greenville, S. C., selected cocoa beige, green and copper fabrics, with frosted walnut Formica, for the interior of his New York-based D18. . . . A 50 per cent weight reduction plus beauty and comfort brought Bobby Barnard and his Suntide Refining Lodestar in from Corpus Christi for a custom-built sleeping couch.

EXECUTIVE AIRCRAFT SERVICE of Dallas delivered two complete new DC-3 conversions last month. L. V. Emery said one was for Dow Chemical, Midland, Mich., Russell Purchase, chief pilot, and is their fourth DC-3. In addition to the full treatment, it included a Collins autopilot, PAA landing gear doors and Bendix radar. The other complete DC-3 conversion was for Seaboard Oil of Dallas, Jim (Led) Ledbetter, chief pilot, and it featured Maximizer kit, picture windows, Super 92 engines, RCA radar and Collins autopilot. . . . Byrl Menard brought in Gulf Interstate Gas's Lodestar from Houston for Bendix radar, ARC ADF, relocation of all radio, rewiring, new radio panels, 1,000-hr. airframe and engine change. . . . In for a 1,000-hr. inspection, interior work, new instrument panel, and rewiring was Creole Petroleum's DC-3 from Caracas, Venezuela, Jerry Warner, chief pilot. . . . British American Oil's Dallas Lodestar received a 1,000-hr. inspection and new interior. Bob Dodson is pilot.

AIR REPORT

(Continued from page 8)

strator seats 52 passengers and is powered by two Rolls-Royce RA 26 Avon jets of 10,000 lbs. thrust each. The engines are mounted aft of the cabin on the sides of the fuselage near the tail, leaving the wing clean. The U. S. tour itinerary includes: Washington, May 8-13; Atlanta, May 13-15; Miami, May 15-20; Dallas-Ft. Worth via Houston, May 21-23; Kansas City, May 23-26; St. Louis, May 26-27; Chicago, May 28-June 3; Denver, June 3-5; Salt Lake City, June 5; Los Angeles, June 5-10; San Francisco, June 10-13; Seattle, June 13-17; Chicago, June 17-19; New York, June 19-20; Montreal, June 20-23.

NARCO OMNIGATOR MARK II production has reached a rate of 15 units daily, believed the highest production rate ever achieved with a business aircraft radio. Over 1,200 Mark II's have been delivered since it was introduced in October, 1956, as an improved version of the Omnigator, of which 7,700 units are in use.

TWO ADDITIONAL FAIRCHILD F-27 PROPJET AIRLINERS have been ordered by West Coast Airlines, increasing its order to six. . . . **BUTLER AVIATION**, Chicago, has ordered a Fairchild F-27 propjet, the 13th U. S. corporation to order the Friendship.

CURTISS-WRIGHT AND BRISTOL AEROPLANE COMPANY OF ENGLAND have new licensing agreements covering a number of gas turbine engines including a Series 550 jet engine for commercial aircraft, said to be quieter than current jets and superior in fuel consumption, thrust and weight, with lower operating temperatures.

New general manager of the **NATIONAL PILOTS ASSOCIATION** is Charles Willis, Jr., boasting a broad experience in commercial aviation operations, government aviation service and in Naval aviation combat during World War II in which he received many decorations. Since the war he has been active in commercial aviation operations and a familiar figure at Teterboro, New Jersey, airport. In 1953-55 he worked in the White House in Washington as assistant on aviation appointments and a member representing the White House on the Air Coordinating Committee. He flies a Beechcraft Bonanza.

JOE MASHMAN, second man ever to fly Bell's original helicopter in 1943, is acting commercial sales manager for Bell Helicopters in addition to his duties as director of sales planning. Cully Weadock, former sales manager, is now general manager of Chesapeake-Potomac Airways, Baltimore.

ELECTRONIC COMMUNICATIONS, INC., is the new corporate name of Air Associates, Inc. Its aviation supplies division is now known as Air Associates Division of Electronic Communications, Inc. F. W. Godsey, Jr., is president.

TWO NEW BEECH DISTRIBUTORS are Jack Adams, Aircraft Sales of Memphis, for parts of Tennessee, Mississippi and Arkansas, and Blue Grass Airmotive of Lexington, Kentucky, for most of Tennessee and Kentucky. Blue Grass officers are Bruce L. Davis, E. J. Davis, Finley H. Davis, Shorty Holsclaw and Vern Casselbury. The Davis family operates the Midland Mining Co. Jack Adams, an airline pilot, has as his officials Joe H. Schaeffer, Jr., George Martin, Mrs. Caroline Parrish and R. J. Livingston. . . . **L. R. (BOB) JESSEN**, former auto dealer at Norfolk, Neb., is the new Beech south central regional sales manager covering Texas, Louisiana, Oklahoma and parts of Arkansas and Kansas.

FIRST COMPLETE TRANSITION FLIGHT has been made by the Ryan X-13 Vertijet, the Air Force's jet-powered VTOL research craft.

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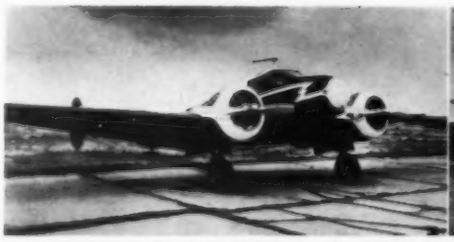
This fleet of outstanding aircraft is being offered as a unit or individually. All have been maintained to perfection by one of the leading maintenance and overhaul bases in the Southwest. Each airplane is completely equipped to offer immediate service without the usual expense of reconditioning. This is an exceptional opportunity for a business firm to purchase one or more executive aircraft that will give long economical trouble-free operation at minimum capital investment.

LOCKHEED LODESTAR

Serial Number 2324, Registration Number N70026, manufactured 1943, Flush riveted, total aircraft time 2,816 hours. **INTERIOR:** Accommodates 11 passengers and 2 pilots. It is finished in Western style with brown leather and light brown cloth headliner; seats are in natural leather (unborn calf skin); window drapes are in cloth to match seats. Main cabin contains a long curved divan, five large reclining chairs, three recessing card tables, a coat compartment, a Barber-Coleman heater with thermostat and storage compartments. Lavatory is finished in leather and contains a wash basin, a toilet container, a large mirror and storage compartment. Galley is finished in leather and contains one passenger seat, triple thermos, large ice box, electrical outlet and multiple storage compartments. **EXTERIOR:** Painted tan with brown trim and white top. **ENGINES:** Wright 1820-56, completely modified and have 741 hours each since major overhaul. **RADIO:** Includes ARC Omni, ILS, dual Bendix ADF, Marker Beacon, ARC 3 Transmitter-Receiver and ARC 5 Transmitter-Receiver. **OTHER EQUIPMENT:** Includes Sperry A3 Autopilot, Grimes Rotating Beacon, 178 gallon Auxiliary and Fuel tank (No. 4 baggage bin). **PRICE:** $120,000.00 net f. o. b. Dallas, Texas.

BEECH D18S



Serial Number A261, Registration Number N80351, total aircraft time 4,884 hours. **INTERIOR:** Accommodates 6 passengers and 2 pilots. Main cabin is finished in grey with curtains to match and contains reclining chairs, a divan, a drop leaf card table, a coat hanger rack, dual thermos and storage compartments. Lavatory includes a toilet container, baggage space and aluminum cabin loading steps. **EXTERIOR:** Painted in very attractive dark green with white trim and white top. **PROPELLERS:** Hamilton Standard Hydromatics. **ENGINES:** Pratt & Whitney R985-14B with 669 hours each since major overhaul. **RADIO:** Dual ARC Type 17 Omni, ILS, 3 light Marker Beacon, ARC 3 Twenty Channel Transceiver, Bendix ADF, ARC T-11 VHF Transmitter, ARC VHF tunable receiver. **OTHER EQUIPMENT:** Includes an 80 gallon auxiliary tank (nose compartment), Grimes Rotating Beacon, windshield wipers and propeller anti-icing. **PRICE:** $37,500.00 net f. o. b. Dallas, Texas.

BEECH B-50 TWIN BONANZA

Serial Number CH-46, Registration Number N-3586B. Total aircraft time since new 737 hours. **INTERIOR:** Blue and grey with white leather seat trim; accommodates 5 passengers and 1 pilot. **EXTERIOR:** Painted blue with white trim and white top. **ENGINES:** Lycoming GO 435-C2 with 737 hours since new. **PROPELLERS:** Beech two blade full feathering. **RADIO:** Lear LVTR 36 channel Transceiver, ARC 15D Omni, ILS, 3 light Lear 2200 Marker Beacon, Lear 14B ADF, ARC T-11 VHF Transmitter and Lear L-F Receiver. **OTHER EQUIPMENT:** Includes Janitrol heater, Grimes Rotating Beacon, Nose Taxi light and Moonglo instrument light. **NEW COST:** $88,500.00. **PRICE:** $49,500.00 net f. o. b. Dallas, Texas.

BEECH BONANZA A-35

Serial Number D 1545, Registration Number N-530B, Total aircraft time 1,337 hours. **INTERIOR:** Very clean, finished in blue and grey with curtains and seat covers. Accommodates 3 passengers and 1 pilot. **EXTERIOR:** Painted blue with white trim and white top. **PROPELLER:** Beech metal propeller with automatic prop control. **ENGINE:** Continental E185-8, 205 horsepower with 147 hours since major overhaul. **RADIO:** Includes Narco Omnigator with ILS localizer, Marker Beacon and 5 channel VHF Transmitter; Lear 5 channel Auxiliary Transmitter; Lear ADF 12. **OTHER EQUIPMENT:** Full blind flight group with DG, Horizon and engine driven vacuum pump, 10 gallon auxiliary fuel tank (baggage bin), Moonglo lights and Stall Warning. **PRICE:** $9,500.00 net f. o. b. Dallas, Texas.

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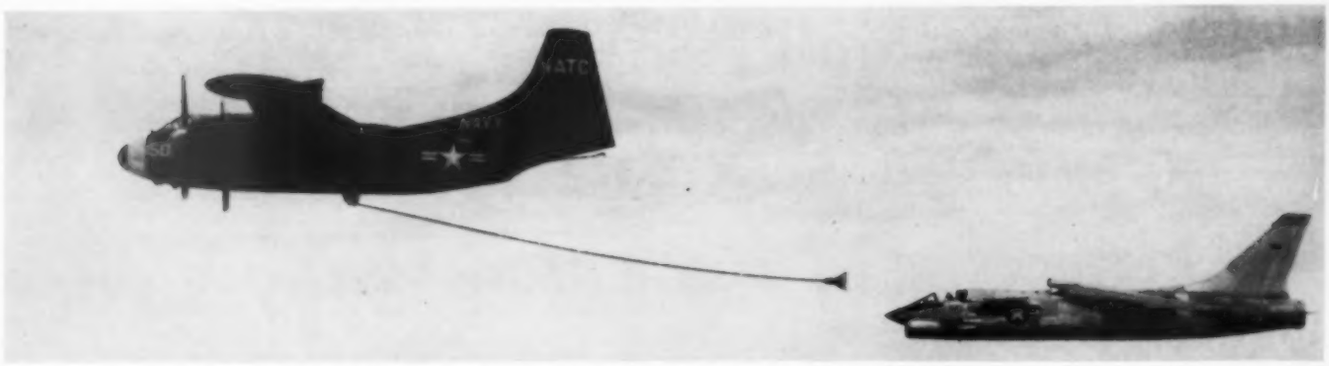

AERIAL REFUELING TO EXTEND RANGE OF SUPERSONIC NAVY FIGHTERS is demonstrated in this U. S. Navy portrait of an AJ-2 tanker trailing a hose to a Chance Vought F8U-1 Crusader. Note the carrier-based Crusader's level attitude with its variable-incidence wing in the "up" position normally used for slow-flight landings and take-off. Crusader's fuel inlet is on fuselage port side behind cockpit and just above the star insignia.

OFFSHORE AIRLIFT

(Continued from page 37)

be called for to keep the machines in operation. All told, a Humble helicopter spends 5.5 hours in checking and maintenance on the ground for every one hour in the air. More man-hours go into the overhaul of an S-55's 600-hp. Pratt & Whitney engine than it spends in the air between overhauls at 480-hr. periods, which compare with 600-hr. recommended periods.

Charlie Scholes never under-estimates the importance of safety and highest possible mechanical integrity. "Our helicopters are carrying the life's pulse of our operating and supervisory personnel," he explains.

As Humble's offshore drilling expands, its utilization of helicopters will, too. Progress in perfecting even larger helicopters and their development of multi-engine safety factors will also increase Humble's helicopter operations and the already-impressive figures representing passenger volume. For one thing, helicopter air cargo has only been sampled with the existing machines. Oil drilling equipment comes heavy. But the day is not far off when rotary-wing transports, especially of the flying-crane category, will begin replacing boats and surface vehicles to the same extent as their relatively small passenger-carrying counterparts have already done with crews and supervisory personnel.

LINDBERGH'S RYAN

(Continued from page 38)

without motor and instruments. Delivery about three months."

In an exchange of messages, it developed that Ryan could cut the three months down to 60-day delivery with a 50 per cent deposit, so Lindbergh went to San Diego late in February with a $15,000 budget and negotiated a $10,580 price, including a new 223-hp. Wright Whirlwind engine. Construction got under way rapidly, Lindbergh acting almost in desperation. He had sought an airplane from Anthony Fokker, who refused on the grounds that only a tri-motor design could make the trip, and from Columbia Aircraft Corp., which had a Wright-powered Bellanca but reserved the right to select its own crew for the New York-Paris attempt.

Between familiarization hops in one of Ryan's M-2 single-engine "airliners," Lindbergh was all over the shop, checking every move made by the 35 men and women in the shop building his custom ship. An atmosphere of tension gripped the shop, especially as ominous reports told of hectic East Coast preparations by others who wanted to be the first to fly to Paris. Rene Fonck's Sikorsky, Admiral Byrd's Fokker and Lieutenant Commander Noel Davis' Keystone had all met with disaster in flight tests, four men being killed and three injured in the process. All of these were multi-engine airplanes.

Exactly 60 days after work had begun on the single-engine Ryan, Lindbergh test-flew the "Spirit of St. Louis" on April 28, 1927, and heavy-load tests began on May 4, with 50 gals. of fuel being added for each succeeding take-off. By May 10, 1927, everything had been completed and Lindbergh, after paying off all his bills, took off for home on the fastest flight ever made from the West Coast at that time, landing in St. Louis 14 hrs. 25 mins. later. Ten days later, the "Lone Eagle" was in Paris, having accomplished what the "experts" had called impossible to prove the airplane was here to stay.

Specifications of the Ryan monoplane in which Lindbergh launched the air age, as furnished by Ryan Aeronautical Company, which is T. Claude Ryan's present enterprise at San Diego, are as follows:

Engine: Wright J-5-C	Whirlwind
Displacement, cu. ins.	788
Rated Power, hp.	223
Compression Ratio	5.2-1
Gross Wt., lbs.	5,250
Fuel Cap., gals.	450
Range, mi.	4,110
Length, ft.	27.5
Span, ft.	46
Wing Area, sq. ft.	319

New York-Paris Flight: 3,610 miles flown; elapsed flying time 33 hrs. 20 mins.; average ground speed 107.75 mph.

JUST AMONG OURSELVES

(Continued from page 14)

the military and civil carriers of suitable truly logistics type aircraft is most necessary, Rentzel holds. All standby projects on aircraft assigned to CRAF should be completed at once so that all such aircraft are truly in a state of instant readiness. This could include the requirement that flight and supporting personnel are ready to go into uniform if necessary to meet "D-Day" assignments.

"We should stop talking about why we can't provide military services with enough airlift and get serious about finding ways and means to do so," Rentzel avers. "The kinds of aircraft now under development to do the job can be used successfully in the commercial airlifting of goods and in the peacetime movement of purely transport military requirement."

There is little doubt but that Rentzel, in referring to "the airline industry" definitely means the entire industry and not just the major trunk airlines. We must include the local carriers, the air freight operators and the independent or supplemental carriers as well. In recent years Federal policy toward the locals and the supplementals has been so restrictive that one would think we have no airlift deficiency in this country and that

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Two of the most important factors that affect jet engine life, efficiency, and safe operation are *Exhaust Gas Temperature (EGT)* and *Engine Speed (RPM)*. Excess heat will reduce "bucket" life as much as 50% and low EGT materially reduces efficiency and thrust. Any of such conditions will make operation of the aircraft both costly and dangerous. The *JETCAL Analyzer pre*determines accuracy of the EGT and (interrelatedly) Tachometer systems and isolates errors if they exist.

The *JETCAL* ANALYZES JET ENGINES 10 WAYS:

1) The JETCAL Analyzer *functionally* tests EGT thermocouple circuit of a jet aircraft or pilotless aircraft missile for error *without running the engine or disconnecting any wiring*. GUARANTEED ACCURACY is ±4°C. at engine test temperature.

2) Checks individual thermocouples "on the bench" before placement in parallel harness.

3) Checks thermocouples within the harness for continuity.

4) Checks thermocouples *and* paralleling harness for accuracy.

5) Checks resistance of the Exhaust Gas Temperature system.

6) Checks insulation of the EGT circuit for shorts to ground and for shorts between leads.

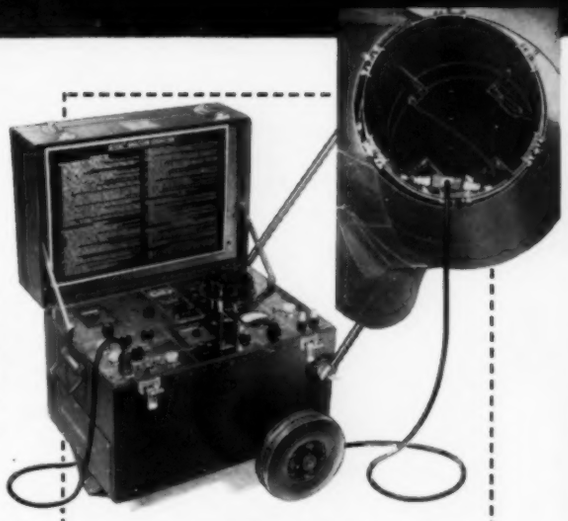
7) Checks EGT Indicators (in or out of the aircraft).

8) Checks EGT system with engine removed from aircraft (in production line or overhaul shop).

9) Reads jet engine speed while the engine is running with a guaranteed accuracy of ±0.1% in the range of 0-110% RPM. Additionally, the TAKCAL circuit can be used to trouble shoot and isolate errors in the aircraft tachometer system.

10) JETCAL Analyzer enables engine adjustment to proper relationship between engine temperature and engine RPM for maximum thrust and efficiency during engine run (Tabbing or Micing).

ALSO *functionally* checks aircraft Over-Heat Detectors and Wing Anti-Ice Systems (thermal switch and continuous wire) by using TEMPCAL Probes.. Rapid heat rise . . . 3 minutes to 800°F! Fast cycling time of thermal switches . . . 4 to 5 complete cycles per minute for bench checking in production.



Tests EGT System Accuracy to ±4°C at Test Temperature

(functionally, without running the engine)

Tests RPM Accuracy to 10 RPM in 10,000 RPM (±0.1%)

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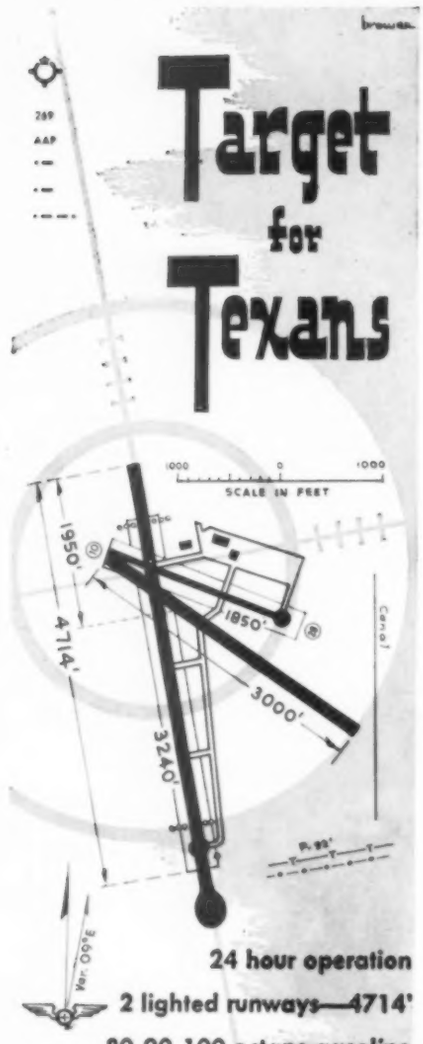

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national defense should not even be considered as a factor in the development of air transportation. Until this official attitude changes in Washington our civil air transport reserve, both machines and men, will be far too limited either in a major emergency or in a "brush-fire" war.

Del Rentzel's constructive proposals make sense. Let's hope others take up the challenge and carry it through to a successful finish so that the neglected problem of a logistic airlift ready reserve will be solved with intelligence and dispatch.

Postscript To Hangars

WE now have it on reliable authority that the Small Business Administration resents the release put out by the CAA late last year announcing that SBA would make loans for hangar construction in many cases where operators could not get commercial credit at banks.

Because of this resentment the SBA simply gives the average applicant for a hangar loan the old run-around. The feeling is: "If the CAA is so smart, let them make the loans."

It's a matter of record that topside CAA officials and topside SBA officials got together in Washington last year and the SBA came through with a "new policy" toward making loans for hangars. The release subsequently put out by CAA and AOPA has irritated the SBA, so, no loans. Isn't this a fine kettle of fish? Big men at work in Big Government!

GENERAL AVIATION SURVEY

(Continued from page 28)

are located in the 151 hub areas in this country.

The concentration of higher performance aircraft is greater in hub areas: As might well be expected, the higher performance aircraft in Class I and II tend to be based in the hub areas. Table 12 shows that in 22 selected large hubs we find 45 per cent of the multi-engine aircraft of Classes I and II, compared with only 27 per cent of the Class III fleet and 24 per cent of the Class IV fleet.

All in all, it appears, based purely upon the location of the general aviation aircraft fleet, that our hub area facilities and traffic control problem may well be the most critical, which point is supported in even stronger fashion by the operation pattern analysis of the next chapter in this report.

This, then, is the picture of the general aviation fleet of today at rest. Class I and II aircraft make up a relatively modest share of the total fleet. In general, they have capabilities to go almost anywhere at any time, and they are flown most often by pilots having the professional competence to exploit the capabilities of these aircraft. These planes tend to be concentrated most heavily in the hub areas.

On the other hand, we have a most important share of the fleet in Class III — planes having a generally high capability to go anywhere any time, these planes flown increasingly for business and commercial purposes, but the full exploitation of their potential in many cases denied by lack of pilot competence. The same remarks hold true, although to a lesser degree, for the Class IV planes. The question arises of how much we should reasonably expect of a pilot in competence to operate within complicated systems of flight and traffic control.

The major patterns presented in this chapter simply serve to confirm the general feelings of those knowledgeable in general aviation — and they give a more precise quantitative base for development of future projections. The next chapter puts this fleet into motion and discusses current operating patterns across the country. (To be continued next month.)

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Amphibious Floats for Piper Super Cub

This 150-hp. Piper Super Cub, one of 20 lightplanes operated along the Atlantic and Gulf coasts for spotting schools of fish for commercial trawlers, has special amphibious floats developed by the Edo Corporation. Designated as Edo's Model 339 floats, this new type is similar to but smaller than Edo Model 289 amphibious floats for the Cessna 180. Retractable main wheels aft of the step and castering nose wheels are actuated by a hand-operated hydraulic pump. The amphibian Super Cub cruises at 100 mph., only 10 mph. slower than the land plane configuration. At 2,000-lb. gross weight, which is 250 lbs. above standard gross, rate of climb is nearly 1,000 fpm. The first installations were performed by Edo for Marion F. Parkinson of Ser-V-Air, Pascagoula, Mississippi, which operates the sea-going lightplane fleet for fishing concerns. —(Edo Photo.)

CANARI SYSTEM

(Continued from page 32)

Kansas City and found that its latest step in the Canari System concept was the establishment of a special installation engineering group. In this group are such specialists as Truman Benson, former Northwest Airlines installation

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At Faulkner Air Radio safety is more than a byword, safety is the WATCH-WORD! Safety in the sale—your assurance that you buy only what you need and want. Safety in engineering—only the most highly skilled technicians touch your equipment. Safety designed custom installations—designed to fit your specific equipment needs. Safety in maintenance—the entire technical staff at Faulkner Air Radio stands ready to maintain your equipment and keep you flying!

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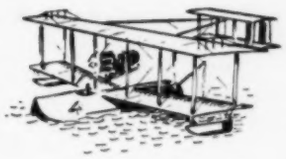

TRANSATLANTIC NON-STOP

Following close upon the Atlantic flight of the NC-4 to the continent of Europe by way of the Azores, was the non-stop flight of John Alcock and Arthur Whittenden Brown.

In a Vickers-Vimy bi-plane powered by two Rolls-Royce 350 h.p. engines, they took off from St. Johns, Newfoundland on June 14th, 1919 and put down, 16 hours and 12 minutes later at Clifden in Ireland.

This was an era when almost every flyer had an idea of establishing some kind of record. Out of it, however, new ideas in aviation design and construction were tested and made practical.

The aviation industry was growing rapidly, and by 1928, need for the financial support of "aviation insurance" became imperative. Several leading insurance companies pioneered to combine their resources in a common pool to supply this need, and organized as the United States Aircraft Insurance Group.

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This vigorous expansion is accurately and graphically charted in all of its intricate details in our forthcoming 8th ANNUAL LOCAL SERVICE AIRLINE EDITION. As in years past, it will be the industry's year-round reference source.

Dynamic — thriving — vigorous — no other terms can adequately describe such local air service accomplishments as the 1956 record of 3,516,242 revenue passengers carried as compared to only 2,963,936 in 1955. . . . expansion of scheduled route mileage flown from 51.7 million in 1955 to 61 million miles in 1956. . . . extension of air service to nearly 500 cities and towns. . . . orders for new propjet, pressurized transports replacing the old DC-3 workhorse on many schedules.

It all adds up to a large and growing market for the aviation industry and its suppliers to the local service airlines — and the recognized market-place is our 8th ANNUAL LOCAL SERVICE EDITION for June.

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engineer who has also been a consultant on corporate-aircraft custom installations, and Bob Christiansen, former airline electronics specialist and in recent years head of the radio department at Anderson Air Activities, Beech distributor at Milwaukee. John Russell, former CAA electronics engineer, is manager of distributor sales. Orin (Moose) Redhead, formerly with Lear, is airborne equipment sales engineer.

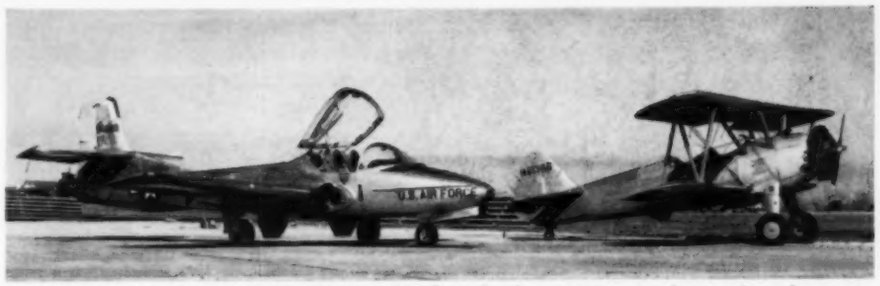
This group's work is not only to further the factory's perfection of the system concept but is in support of Wilcox work with airframe manufacturers and distributors toward simplifying equipment problems. In addition, Wilcox has opened sales engineering offices in Wichita, under Bill Ackerson, who had been an electronics engineer on the Beech Super 18 project, and in Los Angeles, under O. B. Dutton from the Wilcox factory.

Canari System installations already made or contracted for have included a number of Convair 440, Douglas DC-7B, Lockheed 1049G and Lockheed propjet Electra airliners. Negotiations were under way for Canari installations for the Douglas jet DC-8 Fairchild F-27 Friendship and the Sud Aviation jet Caravelle for Air France.

When we visited the Wilcox factory, it was our impression that the Canari System had been handed down from Wilcox's airline developments so that it would now become available to business planes. But Jay Wilcox, president, corrected this impression.

"This entire concept began with our interest in business planes and went up from them to become available to the airlines," Wilcox said. "I bought a Beech Bonanza in 1951 and learned to fly. It didn't take me long to realize that radio equipment at that time simply did not offer the quality which the airplane offered. To me, Beech and other business airplane manufacturers were at the mercy of whatever equipment happened to be available. This was emphasized even more to me when we acquired a twin-engine Beech 18 — if ever a fine airplane critically needed radio equipment with drastic improvements, it is the 18, because it is so sensitive to space and weight requirements imposed by conventional radio gear."

So it was from personal experience with business plane equipment handicaps that the Canari System was conceived and developed by the Wilcox company. After the Canari System was announced in 1955, Wilcox received advance orders amounting to a $3,500,000.00 backlog within 90 days. It now has more airborne equipment backlogged than ground equipment, with Eastern Air Lines, Beech Aircraft and Aero Design among its chief customers for the new airborne equipment.



TEN YEARS OF PROGRESS in Wichita-built trainers is shown by this 400-mph. twin-jet Cessna T-37 and 120-mph. piston-engine Boeing Kadet, formerly the Stearman, of which 10,346 were produced. —(Boeing Photo.)

Wilcox is convinced that standardization is necessary to attain highest quality standards and most efficient installations and equipment operation. Because basic communications and navigation equipment are so vital to dependable, economical and large-scale utilization of business airplanes, airframe design and production should be based on equipment needs — while

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equipment development is in turn based on airframe needs. Benefits will become just as important in servicing as in installations.

Wilcox says refinements are constantly reducing power requirements for airborne radio and electronic equipment. Moreover, newer type equipment components have a longer useful life. Strict adherence to quality standards is providing better performance and more dependable operations. The big advantages are weight and space reductions and simplified installations, making equipment more accessible for servicing.

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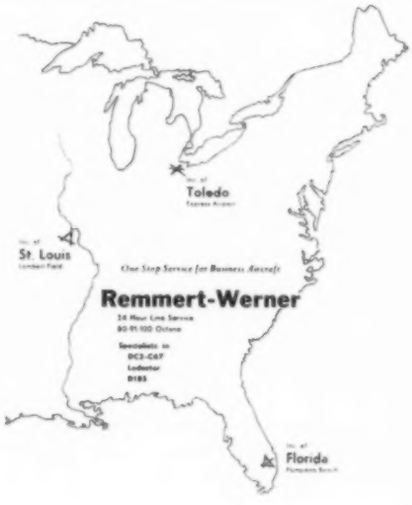

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